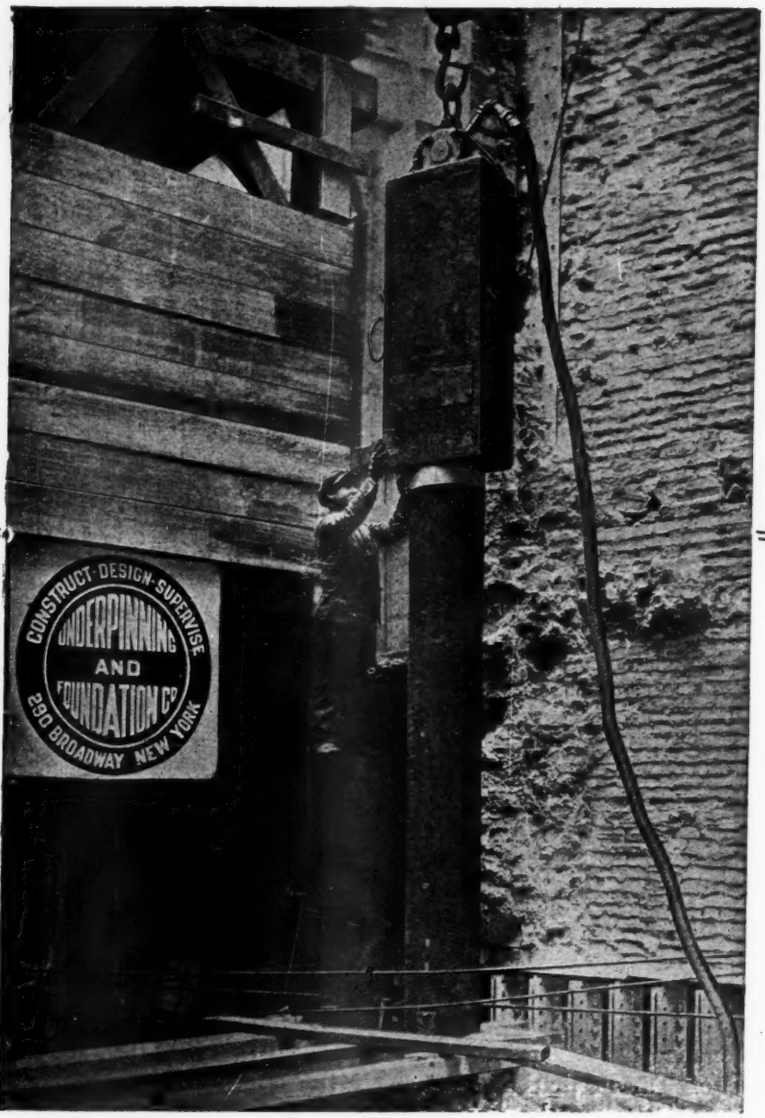
power when the body reaches an ex-

POWER DUMP OPERATED FROM DRIVER'S SEAT BY SCREW AND SHAFT PROTECTED MECHANISM

PUBLIC WORKS

CITY COUNTY STATE



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A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Entered as Second-Class matter at the Post Office at Floral Park, N. Y., August 27, 1920, under the Act of March 3, 1879.

Vol. 49 FLORAL PARK, DECEMBER 11, 1920 No. 24

Constructing Asphalt Block Pavement on Bronx Parkway

On this job the contractor is using an unusually complete and up-to-date outfit of labor-saving appliances for all phases of the work, from grading to final laying of blocks.

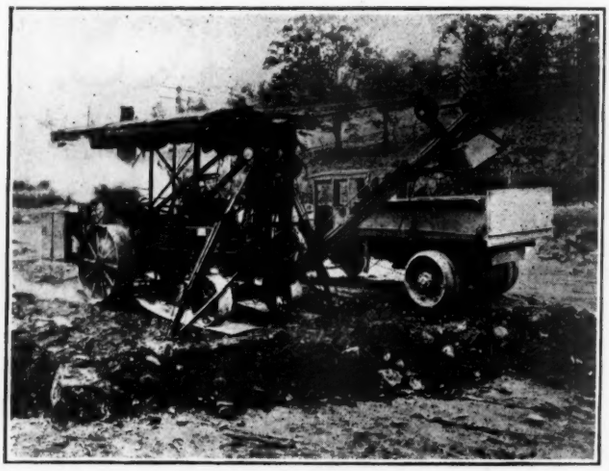
The Bronx River Parkway Reservation, now in course of construction, extends from Bronx Park, Borough of the Bronx, New York City, to Kensico Dam, Westchester county, N. Y., a distance of about 15½ miles.

During the past summer a stretch of asphalt block pavement has been laid for the Bronx Parkway Commission by the Hastings Pavement Co., the contract extending from Crane road, Scarsdale, to just inside the southern boundary of White Plains, a total distance of about 13,000 feet, the area of the pavement laid being about 57,000 square yards. The concrete base for this work was completed about the middle of November and the laying of the asphalt blocks was within about a week of completion on the date at which the writer visited the work, November 19; except that at three points breaks were left in the pavement at stream crossings where bridges are now being built and fills of several feet depth will have to be made when they have been completed.

The base throughout is of concrete mixed 1:3:6, 5 inches thick at the sides and 7 inches thick at the center, with a curb 2⅜ inches high where the land slopes away from the road, and 5½ inches high where it slopes up from the road; the former bringing the curb practically flush with the pavement surface and thus permitting the rain water to flow off onto the ground, while the higher curb provides a gutter 3 inches in depth for carrying off the storm water; storm water inlets being provided at intervals of about 300 feet and discharging into the Bronx river, which lies quite close to the roadway throughout most of the work. The surface is of standard asphalt blocks, 2 inches thick, 5 inches wide and 12 inches long, laid on

LAYING CONCRETE BASE FOR ASPHALT BLOCK ON BRONX PARKWAY

Tructractor takes stone from loader at the left, then sand from a loader just beyond the picture at the left, then runs to one of the two mixers seen in the background and dumps directly into loading skip.

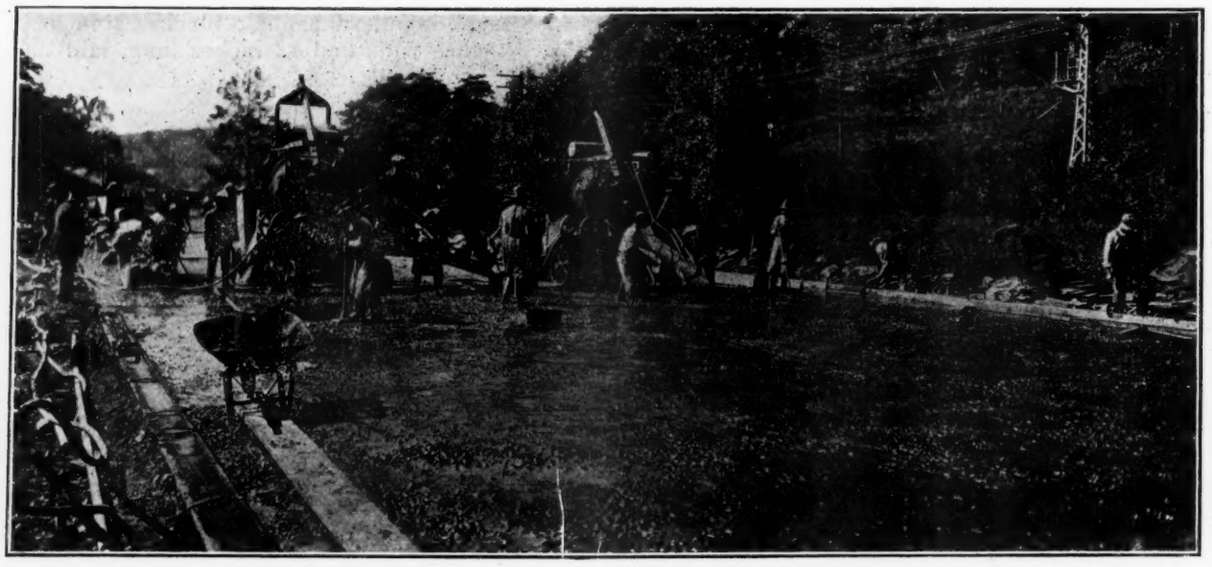


KEYSTONE EXCAVATOR GRADING ON BRONX PARKWAY

a ½-inch bed of cement mortar mixed very dry. The roadway is 40 feet wide and has a crown of 5 inches on tangents.

The sand for the concrete was obtained about two miles from the work and was loaded into auto trucks by means of a Haiss "Path Digging" wagon loader, which was able to load a five-yard truck in about five minutes. The sand was dumped along the sub-grade in piles at the proper intervals along one side of the road. Stone, which was obtained from the Hudson River Quarries, transported to Hastings-on-Hudson in barges and hauled to the work by motor trucks, was piled along the opposite side of the road about midway between sand piles. A Haiss wagon loader was stationed at the sand pile and another at the stone pile, and these loaded Clark Tructractors from measuring hoppers supported on each loader, which Tructractors carried the aggregate to a concrete mixer about fifty feet away. The empty Tructractor comes down one side of the roadway and receives its charge of sand, then crosses to the other loader and receives its charge of stone, and then returns to the mixer on that side of the roadway. This prevents any interference of the Tructractors with each other. Due to the width of the road, two concrete mixers operating side by side were used and the three Tructractors kept these in continuous operation, carrying a half cubic yard of material in each load. When the work was running smoothly, each Tructractor would de-

LOADING STONE BY HAISS LOADER INTO CLARK TRUCTRACTOR



LAYING CONCRETE BASE AND EDGING ON BRONX PARKWAY

Concrete mixers in the foreground; wagon loader and tructractor in background

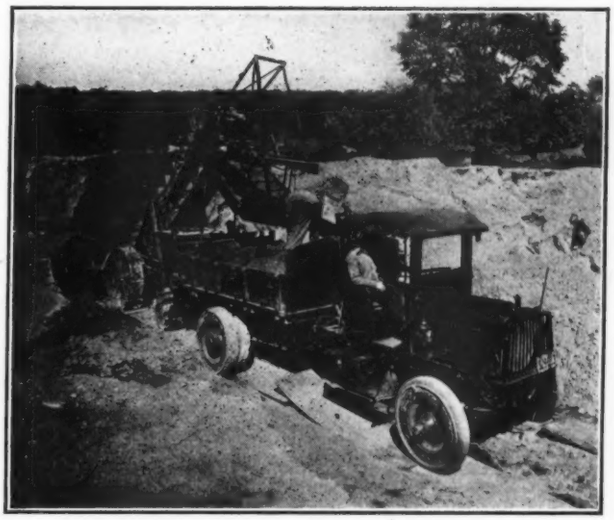
liver a half yard a minute, or about one yard to each mixer for each one and one-third minutes. The Tructractor discharged its load of combined sand and stone into the power loader and at the same time a bag of cement was emptied onto the aggregate and the loader was immediately raised and discharged into the mixing barrel. The two Foote concrete mixers were self-propelled.

The number of laborers required was three for the two loaders, one for each of the three Tructractors, two handling cement, and ten in the gangs of the two mixers, making a total of eighteen laborers on the work.

Water for the concrete was obtained very conveniently from the Bronx river, which at most places was within one hundred feet of the roadway, being pumped through an inch and a half pipe by a small gasoline pump.

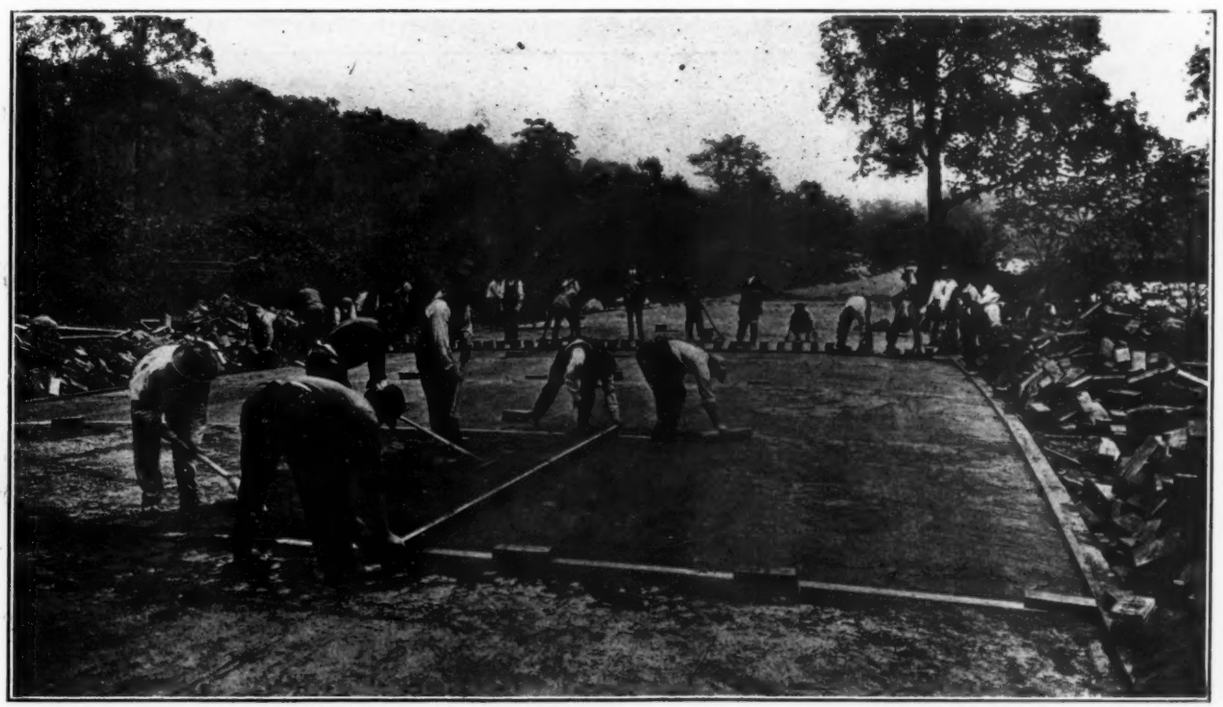
After the concrete had set sufficiently, the asphalt blocks were laid. In this work a gang of from forty to forty-five men was used. The blocks were piled along the side of the roadway and were conveyed to the layers by means of two gravity carriers and eighteen laborers, who supplied the three expert block layers. The blocks were laid on a one-half-inch mortar bed, cement being mixed with the sand in the proportion of one to four, a Foote mixer was used for mixing the sand and cement. The bags of cement were brought to the work in Tructractors, twenty bags to a load, and the sand was brought from the sand bank by motor trucks.

The sand and cement mixture was spread carefully for the base. At intervals of about fifteen feet thin steel plates four inches wide and ⅛ inch thick were set carefully to the surface desired for the mortar bed by means of ordinates measured from a cord drawn tight across the road. Mortar



LOADING SAND AT SAND PIT IN WHITE PLAINS
Screen and gravel deflector supported from top of Haiss wagon loader

was spread between these lines of steel plates and a 4-inch steel channel was drawn across the road, the two ends resting on the two lines of steel plates, as a template for surfacing the sand cushion. In the mixing, a small amount of water had been added to the mortar, and after surfacing with the template this was so thoroughly compacted that walking upon it would leave footprints depressed only a small fraction of an inch. Following the surfacing of the mortar bed by the template, the steel bands were removed, the depressions from which they were removed were leveled off, and by means of a small hand template with a shoulder for riding on the top of the



STRIKING OFF THE MORTAR BED AND LAYING BLOCKS.
The steel plates used as a template, the I-beam screed and the gutter screed used for finishing mortar surface at joints are plainly visible.

LAYING ASPHALT BLOCKS ON A 20-FOOT ROADWAY
Blocks delivered by Mathew's gravity carrier

curb, the cushion along the gutter space was carefully graded. Immediately following this, the blocks were laid and a short distance behind this fine sand was spread in a thin layer over the surface and brushed into the joints. At intervals of fifteen feet along the center line of the pavement a row of anchor blocks was laid, each anchor block being provided with a steel band set in the bottom of the block so as to extend about a half inch into the mortar bed. These anchor blocks prevent the "creeping" of the pavement, which formerly gave much trouble with this type of pavement.

The men employed on the laying of the asphalt blocks consisted ordinarily of the following: Three men cleaning the base ahead of the block laying, piling sand, etc.; one with a pick removing protruding stones and other high spots in the base. At the sand-cement mixer, one man handling cement bags, one operating the mixer, three shoveling sand and two with wheelbarrows carrying the material to place; five men leveling off the sand cushion and surfacing it with the template; two men setting the steel bands for surfacing the cushion; eighteen men delivering blocks to three brick layers, and two other layers setting in fillers along curbs, assisted by two men cutting blocks to the necessary length; three men screening, wheeling and spreading sand on top of the blocks. In addition was the driver operating the Tructractor which brought the cement and two on the sand truck. This gives a total of forty-seven men and a foreman. This gang laid about three hundred feet a day of forty-foot roadway. The appliances used on this work consisted of the Foote mixer preparing the sand cushion, two Mathew's gravity conveyors, the Tructractor, the automobile truck and two or three McGowan "transveyors," a small hand truck which was used for carrying packages of cement bags and any other materials too heavy for the hand, but not heavy or bulky enough to require a truck.

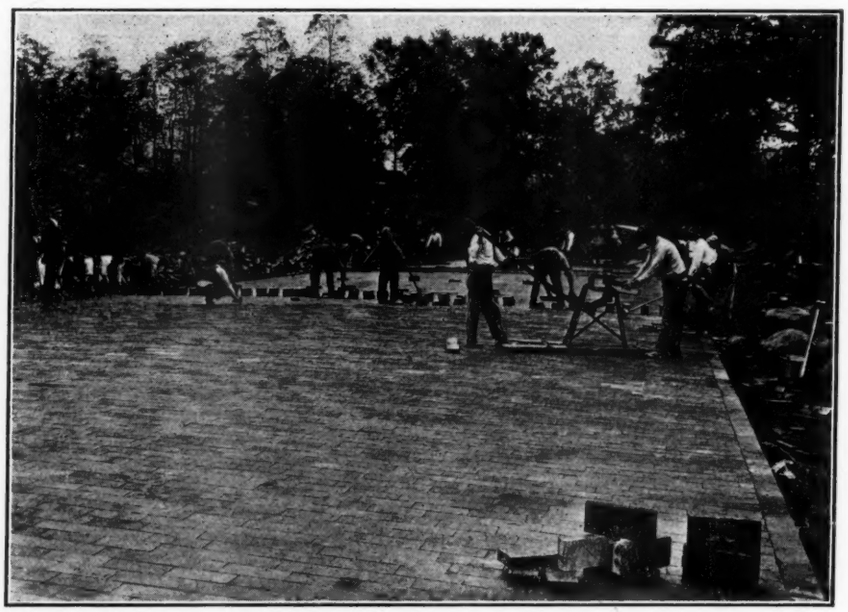
Engineering and construction work of Bronx Parkway Commission is under the supervision of Jay Downer, engineer and secretary; L. G. Holleran is deputy chief engineer, and Chester A. Garfield is field assistant engineer in charge of construction contracts.

Leslie B. Farr was general superintendent for the contractor, assisted by Superintendent H. P. Halstead; George W. McIndoe is chief engineer of construction for the contractors, the Hastings Pavement Company.

Force Account Paving in St. Paul

More than two hundred thousand dollars' worth done last year. Fifteen to twenty-five per cent saved over lowest bids.

The Department of Public Works of St. Paul, Minn., does more or less paving work by force account, when it estimates that it can do so at less than the lowest contractor's bid or when no bids are received. In a report dated April 3, 1920, Oscar Claussen, chief engineer of the department, reported that during the previous year five pavements had been laid by force account at a total cost of $200,587. For three of these no bids were received. Of the other two, one cost $70,861, while the lowest bid, plus 2 per cent for cost of city inspection, was $82,571, or 16.52 per cent higher than the actual cost. On the other pavement the actual cost was



LAYING ASPHALT BLOCKS
Machine for cutting closers for courses at right; bottoms of anchor blocks shown in right foreground. Mortar mixer faintly visible in background

$12,662 and the contractors bid plus 2 per cent for inspection was $16,209, a saving of $3,547, or 28 per cent. The figures of actual cost include 3 cents per square yard for brick and creosoted pavements and 10 cents per square yard for asphalt pavements to cover depreciation of equipment, the total amount charged to depreciation being $1,727.

Since 1915 the average price paid for brick pavements has increased from $2.20 per square yard to $5.25, and asphalt pavements have increased from $1.67 to $3.20; the increase from 1919 to 1920 having been from $3.35 to $5.25 and from $2.82 to $3.20, being in each case the greatest increase of any twelve month period.

The city had owned and operated for making asphalt repairs a portable asphalt plant with a capacity of 500 square yards, but during the year this was sold to a paving contractor for $3,000, and all repair work was done with an F. D. Cummer & Son plant which has a daily capacity of 1,100 square yards and it was planned to purchase a new plant of 2,000 square yards capacity. The Cummer plant turned out 59,465 square yards of cut-out work and 5,830 square yards of burner work during the season. Of this 1,649 square yards was for public service corporations, largely repairing cuts of small area, and these were charged $2.25 a square yard up to September 1st when the price was increased to $2.75. Work was also done for the street railway company, which was charged $1.50 for burner work, $1.75 for sheet asphalt cut-out work, and $1.50 for asphaltic concrete cut-out work until September 1st when the charge was increased to $2.25 for sheet asphalt cut-out work. The above charges are based on actual cost of labor and material plus an estimated cost for general supervision, accounting, repairs, depreciation, insurance and interest on the asphalt plant, and was accepted as satisfactory. The cost for the year of plant operation, material and hauling to the street was $97,627.

The total area of asphalt pavements on which repairs were made, that is, the original contract areas on the city's portion of the street, was 353,121 square yards. The area of repairs actually made was 54,944 square yards, or 15.5 per cent of the original contract area. The average cost per square yard of original area was 15 cents. The total area of asphalt pavement on which repairs were made for the street railway company was 47,364 square yards, of which 15 per cent was repaired, at an average cost per square yard of original area of 17.6 cents.

New York-Staten Island Tunnel

New interest is now being taken in the long-proposed plan for a freight tunnel to connect Staten Island with the mainland. The activity during and subsequent to the war of several important shipbuilding plants on the island, the continued growth of the large warehouse and docks established on the east shore of the island, and the construction now far advanced of 12 large municipal piers in the upper bay, increase the necessity for freight communications with the mainland and with New York City and justify special attention now being given to the subject by the Staten Island Chamber of Commerce.

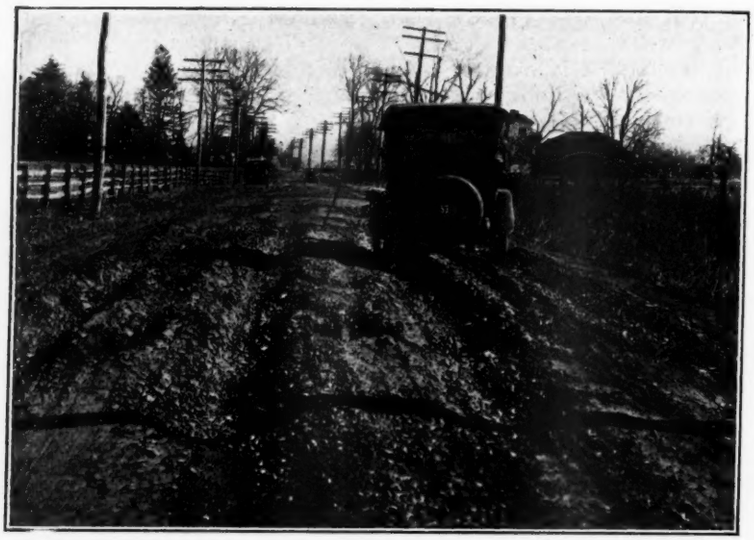
Various plans and locations have been proposed and committees of engineers, real estate men and commercial interests have from time to time been appointed to report on the subject. The last proposition is to discard the lines suggested to Bay Ridge or to Manhattan and to construct a tunnel from the Municipal piers to a point on the Kill where it can make a comparatively narrow submarine crossing to the Jersey shore and connect there with the Pennsylvania, the Central Railroad of New Jersey, the Lehigh Valley, the Reading, the Baltimore & Ohio, and the Lackawanna roads. Special arrangement in harmony with the Connecting Railroad, Hellgate bridge and lines across the Bronx to the Greenville yards and shortened car float ferries will make much more available for New York and the Brooklyn and Jersey warehouses and piers a large amount of business that can be most advantageously handled in Staten Island. The estimates for the new plans have not been made public, but it is known that there are no serious physical obstacles, that the land and river tunnels can be driven readily by advanced methods, and that the right of way and terminals can easily be secured on Staten Island.

280 Mile Road Contract

Work was begun on November 12 on a contract held by Twohy Bros. for the construction of 280 miles of 16-foot concrete road in Maricopa county, Arizona. The contractor expects to build the entire length of road in three years, and complete the entire contract with only eight set-ups of his material plant. This is made possible by the fact that a considerable part of the 280 miles consists of an interconnected gridiron layout of roads lying northwest and southeast of the city of Phoenix.

The contractor is using the most modern methods in every branch of the operation. His equipment represents an investment of nearly one-half million dollars, and includes four Lakewood 14-E gasoline pavers with batch transfers, 18 miles of narrow-gage track with twelve six-ton gasoline locomotives, 216 Lakewood road cars complete with batch boxes and cement compartments, eight double-truck cars, four finishing machines, two bulk cement handling plants, each with a capacity of 900 barrels a day, 800 scarifiers and one clamshell bucket. At present two mixers are operating from one material plant and turning out concrete at the rate of 1,300 lineal feet a day, and it is proposed to lay with these the first forty-one miles of road before the material trestle and cement shed are moved. One mixer is seven miles from the material plant and the other is two miles. A second material plant is to be ready for operation about January 1.

The materials are delivered in bottom-dump railroad cars which are shunted on top of a trestle and dumped directly into bunkers under the trestle, from which the materials are loaded by grav-



ORIGINAL BITUMINOUS MACADAM SURFACE OF PHILADELPHIA PIKE, ON MAIN LINE FROM PHILADELPHIA TO WASHINGTON. FAILURE DUE TO POOR SUB-GRADE AND HEAVY TRAFFIC OF GOVERNMENT CONVOYS

ity into tip-over batch boxes. The sand and gravel are obtained from Tempe, where the contractor has installed a washing and screening plant having a capacity of 1,500 yards a day. Cement is received in bulk and is unloaded by means of a Dracco vacuum plant. From the time it is loaded into the railroad cars none of the concrete material touches the ground until it is placed on the road as concrete.

The Philadelphia Pike

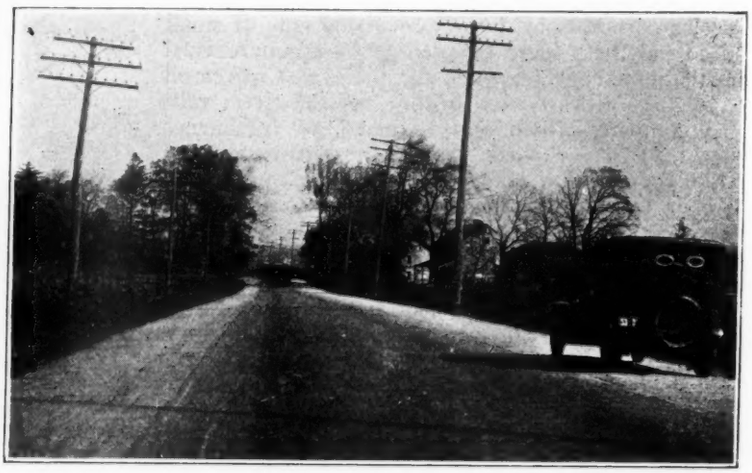
One of the most traveled roads in Delaware is the Philadelphia Pike, which carries a very large and heavy traffic of automobiles and auto trucks between Wilmington and Philadelphia.

At the Wilmington end the grades were steep and the surface poor and in 1918 a contract was let for rebuilding 3.7 miles there with a 19-foot brick pavement on a concrete base with penetration macadam shoulders. The work involved heavy rock excavation and was impeded by traffic, by delay in securing materials, by transportation embargoes by rulings of the United States Highway Council and the Capital Issues Committee, yet it was never completely shut down, and was executed for $92,000 per mile.

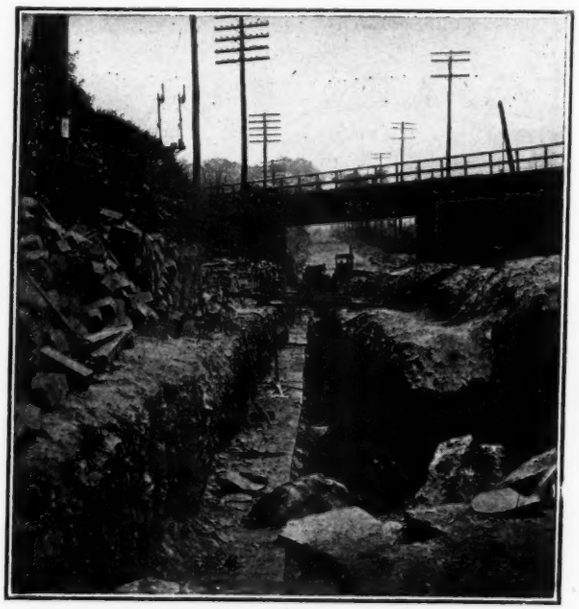
The grade was reduced one-half by cutting off the top of Penny Hill by the excavation of 5,000 yards of rock blasted out of a cut 45 feet wide and 12½ feet deep.

A census of traffic during construction showed from 2,000 to 6,000 motor vehicles per day, averaging 3,000, and increasing 75 per cent in one year.

As the New York-Washington telephone cables, carrying government business, were installed on this road and it was imperative that their service should not be interrupted, impaired or jeopardized in the wartime period, when the road work was in progress, special precautions were observed and the cables were temporarily transferred to poles while a trench was blasted for their permanent installation.



FINISHED 18-FOOT VITRIFIED BRICK PAVEMENT ON PHILADELPHIA PIKE, NEAR WILMINGTON



EXCAVATING TRENCH FOR NEW YORK-WASHINGTON TELEPHONE CABLE

Deepening the Delaware River

The project of deepening the Delaware river from Philadelphia to the sea so as to provide a channel 35 feet deep at mean low water and 800 feet wide is now more than half completed. There still remains to be removed about 24,000,000 yards of dredging and 80,000 yards of rock excavation, in addition to the construction of dykes, bulkheads and other improvements.

Width of Roadways

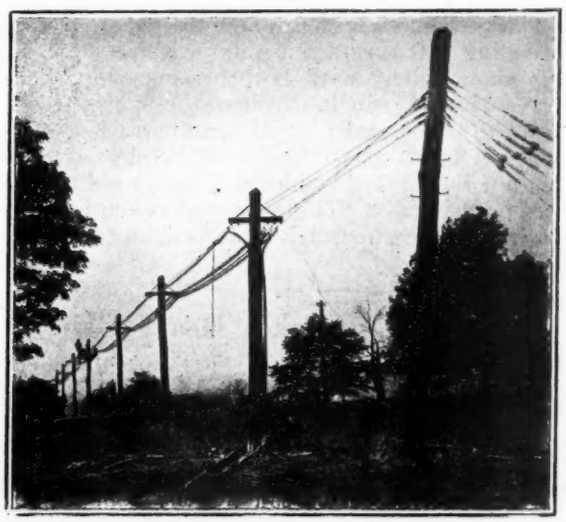
Review of earlier ideas and conclusions in the light of the increasing sizes and numbers of auto vehicles. Suggested standards for different conditions.

The determination of roadway widths is not a matter susceptible of exact scientific treatment, as several rather indeterminate factors enter into it. The subject has been widely discussed and not much that is new can be added, but a review is warranted, especially because of the development of motor-driven vehicles.

Economy demands that roadways have no greater width than is necessary, in order to save construction costs, while too narrow width may be ultimately uneconomical by compelling later reconstruction in order to meet the demands of traffic. Uneconomical width of roadway may have been caused by the adoption of some arbitrary rule fixing the relation between width of roadway and distance between property lines, or by underestimating the future growth of traffic, or the laying of street railway tracks through streets where they had not been contemplated.

The correction of the difficulties brought about by providing too narrow a roadway involves a reconstruction or widening, generally at very great cost, and hindrance or annoyance to public travel in the meantime. The appearance of the road may be one of the determining factors in deciding upon its width, this including provision for proper width of sidewalks, parking strip or lawn on one or both sides of the sidewalk, etc. This applies principally to parkways, boulevards and certain classes of residence streets where beauty and proportion control the design to a large extent. Even here the expected traffic should receive consideration, but its subordination to other conditions may be perfectly logical and free from criticism.

*Abstract of Paper before the American Society for Municipal Improvements, by Robert Hoffmann, commissioner and chief engineer, Cleveland, Ohio.



TELEPHONE CABLE TEMPORARILY CARRIED ON POLES AND MAINTAINED IN UNINTERRUPTED SERVICE CARRYINC WAR DEPARTMENT MESSAGES WHILE ROCK EXCAVATED WAS BLASTED ALONG THE LINE

The financial aspect of roadway widths is apparent. Should the road building programs throughout the country now being advocated progress to the point of construction, it does not seem impossible that for some time to come 10,000 miles of pavement will be constructed annually. An extra foot in roadway width involves an expenditure of from $2,000 to $3,000 a mile for pavement under present conditions. For this country's entire road building project, therefore, a sum of from $20,000,000 to $30,000,000 becomes involved annually in the addition or rejection of a single foot of roadway width. This represents waste if the extra foot in width is unnecessary, but means ultimate economy if the additional foot will be required by traffic.

In addition to the unnecessary cost, unnecessary removal of labor and material from useful application elsewhere is to be regretted.

A too narrow roadway may result in slowing down the speed of traffic, causing accidents due to collisions, or by vehicles being forced off the pavements, and in bringing about a general curtailment of the usefulness of the highway.

The size of the vehicles, the speed with which they are to be driven and the clearance between passing vehicles that must be provided, all are important factors. Passenger vehicles as a class may be assumed to have a maximum over-all width of 6 feet and trucks of 8 feet. There seems to be a natural tendency toward increasing the width of trucks, but so far the maximum of 8 feet seems satisfactory. A rapidly moving passenger vehicle requires greater clearance for safety than a slow vehicle. A provision of 10 feet would seem to allow adequate clearance for all vehicles provided the maximum width of trucks does not exceed 8 feet. This is one or two feet wider than was formerly advocated; but seems warranted by the increase in size of trucks.

This would require a roadway 20 feet wide for two lines of vehicles. Some state roads have been built 14 feet and these are generally found altogether too narrow, while 16-foot and even 18-foot roadway widths are being abandoned for 20-foot by several of the Eastern states.

The length of vehicle has little effect upon the width of tangents, but on curves should be allowed for in providing the additional width at these points. Where long vehicles have to back to the side of the road in order to load or unload, this has a very serious effect on the width. Many trucks are 25 feet long and have become a determining factor if their use necessitates backing up to the curb or to the side of the traveled roadway.

Ten feet would seem to be ample width for a roadway restricted to one line of vehicles, a case which seldom occurs. On light-traffic roads where utmost economy must be practiced, the minimum width must generally provide for two lines of vehicles and should be 20 feet, although this may be reduced to 16 feet where the shoulders are so constructed that vehicles can safely pass each

ice should not be interrupted, impaired or jeopard-

EXCAVATING TRENCH FOR NEW YORK-WASHINGTON TELEPHONE CABLE

other. Ten feet width for each line of vehicles is recommended as applying to all moving vehicles, including street railway cars, with 7½ feet for vehicles parked along and parallel with the side of the road. If these figures be assumed as fixed, the problem of establishing roadway width is one of determining the number of lines of moving and standing vehicles.

In making such determination, the growth of traffic must be considered but must be determined by judgment as no exact data can be obtained. It is well known that the improving of a road by proper alignment, easy grades and a smooth surface invites traffic, bringing to such road a far greater number of vehicles than had previously driven over it, and also usually new buildings which in turn bring added traffic in both trucks and passenger vehicles. It is also a matter of nice judgment to determine where allowance should be made for vehicles stopping along the side of the roadway.

The author offers the following classification as a suggestion of roadway width in accordance with the foregoing ideas:

(A) City Streets Having Double Street Car Tracks

1. Roadway 75 or 80 feet in width. A roadway of such width will accommodate on each half one line of street cars, two lines of moving traffic and one line of standing vehicles; or one line of street cars and three lines of moving traffic. In the latter case the 80-foot width is preferable. The distance between property lines should be from 106 to 120 feet.

2. Roadway 55 or 60 feet in width. A roadway of such width will accommodate on each half, one line of street cars, one line of moving traffic and one line of standing vehicles, or one line of street cars and two lines of moving traffic. In the latter case the 60-foot width is preferable. The distance between property lines should be from 80 to 100 feet.

3. Roadway 40 feet in width. A roadway of such width will accommodate on each half one line of street cars and one line of either moving traffic or standing vehicles. The distance between property lines should be at least 60 feet.

(B) City Streets Having No Street Car Tracks

1. Roadway 40, 55 or 60 feet in width. Same condition as for streets having street car tracks, except that line of street cars is replaced by line of moving vehicles. Absence of street car tracks will frequently permit traffic going in one direction to occupy more than half the roadway. This would be possible when traffic is periodically greater in one direction than the other.

2. Roadway 20 to 35 feet in width.—Residence streets. A roadway of such width will accommodate two to four lines of traffic under different combinations of moving and standing vehicles. The distance between property lines should be 40 to 60 feet.

(C) Highways Outside of Cities

1. Roadway 40 or 55 feet in width. For traffic between important centers of population. A roadway of such width will accommodate four to six lines of traffic under different combinations of moving and standing vehicles.

2. Roadway 30 to 40 feet in width. For traffic between centers of population of less importance than the foregoing. A roadway of such width will accommodate three or four lines of traffic under different combinations of moving and standing vehicles.

3. Roadway 20 to 30 feet in width. For traffic between cities and smaller places or between important smaller cities. A roadway of such width will accommodate two or three lines of traffic under different combinations of moving and standing vehicles.

4. Roadway 16 to 20 feet in width.—Rural highways. A roadway of such width will accommodate two lines of traffic.

5. Roadways 8 to 10 feet in width. Light country traffic where earth at side can be used to a limited extent.

(D) Streets In Small Towns and Villages

1. Same classification as in cities, except that additional width may be required for standing vehicles where business is concentrated on few streets, so as to permit parking perpendicular or at an angle to the curb. Twenty to twenty-five feet for each row of standing vehicles will be desirable in this case.

It must also be decided what streets, if any, are to be used for the parking or storage of cars. It may be necessary to so design roadway widths that the greatest number of cars may be accommodated within a limited district, which may require provision for cars standing at an angle with the curb.

A Watertight Sewer

Unusually good construction has been secured in building on Ralph avenue, Brooklyn, about 3,000 feet of 54-inch circular concrete sanitary sewer at a maximum depth of 10 feet or more below ground-water level in sandy soil.

Immediately after completion the amount of leakage in the whole length of sewer was measured and found to be only 14 quarts in 40 seconds, not nearly enough to provide full flow through a ½-inch pipe. No waterproofing solutions or fabric were used on the sewer, which was a part of the regular contract by the J. F. Cogan Company, who built at the same time the large adjacent twin storm-water sewer under the direction of Arthur J. Griffin, chief engineer, Bureau of Sewers, Borough of Brooklyn.

The invert is paved, up to the spring line, with selected bricks, the upper course of which, on each side, was omitted and when the arch was concreted this space was filled with cement mortar, also covering the top of the side wall and making a special skewback bed for the fresh concrete. Although large quantities of ground water were encountered, by means of a special drainage channel the invert concrete was kept dry until well set. The concrete was mixed with great care, and was wet enough to flow to place without shoveling. It was 1:2:4 mix, without lime and was made chiefly with ¾-inch stone, none being larger than 1½-inch. When the concrete was found to lack usual plasticity an extra bag of cement per batch was added with good results. It was not rammed or rodded but was puddled with hoes occasionally. The work was executed under the immediate supervision of Assistant Engineer I. H. Kirby.

Open Shop Makes Heavy Gains

From data received in a nation-wide survey made by the Iron Trade Review, it is announced that 1,665 chambers of commerce and 540 other organizations in 247 cities located in 44 states have undertaken a campaign for the promotion of open shop which in some cases takes the form of public demonstrations to secure the pledges of all employers to the open-shop policy. Among the organizations pledged are 23 national trade and industrial associations.

PUBLIC WORKS

Published Weekly
by
Municipal Journal and Engineer, Inc.
Publication Office, Floral Park, N. Y.
Advertising and Editorial Offices at 243 W. 39th St.,
New York, N. Y.

Subscription Rates

United States and Possessions, Mexico and Cuba....$3.00 per year
All other countries .....$4.00 per year

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Telephone (New York): Bryant 9591
Western office: Monadnock Block, Chicago

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Convention Attendance by City Employees

Practically every branch of municipal work which requires specialized information for its proper conduct is served by an organization such as the water works associations, American Society for Municipal Improvements, firemen's associations, highway associations, Association of Municipal Electricians, etc. Ought municipalities to pay the expenses of its employees who attend these conventions? In the majority of cases, we believe, the expenses are so paid, presumably on the basis that the information and inspiration obtained at these conventions will result in an increased efficiency which will more than compensate for the money spent.

In the 1919-1920 report of Edward E. Wall, water commissioner of St. Louis, he states that these privileges should be granted and the expenses paid by the city of having its representatives at these conventions "where the advertising value is apparent and where the city reaps the benefit in the increased value of the services of technical men whose ideas have been broadened and whose knowledge has been increased through association and acquaintance with the brightest minds in the country, who gather together for the purpose of exchanging ideas at these national meetings. To allow the city of St. Louis to go unrepresented at such annual conventions as those of the American Water Works Association, American Public Health Association, American Society of Civil Engineers, and the Amercan Society of Mechanical Engineers, in all of which organizations the St. Louis Water Works has been well and favorably known for years, and to whose proceedings and publications employees of the water division have been frequent and valued contributors—to allow the active participation of the city of St. Louis in all these societies to lapse would be a grave mistake and would entail the loss of prestige in national technical circles that might never be regained. The amount of money annually spent by the city for representation at these meetings is insignificant when the great and lasting benefit of such national advertising is considered."

In all branches of human activity progress is being made so rapidly that anyone getting out of touch with it for only a few years will find himself sadly behind the times. And nothing is more certain to give a man a definite idea of recent progress and broaden his vision than attendance at these conventions, and the city whose officials and higher employees are not encouraged to take advantage of such opportunities is bound to suffer in the efficiency of the services rendered it.

Municipal Bonds in Demand

The demand for municipal bonds during November resulted in more favorable terms being obtained by states, counties, cities and towns, which disposed of nearly $50,000,000 worth of bonds during the month, according to the Daily Bond Buyer of New York.

The generally unsettled condition of business, the slump in stocks and commodities, and the sharp decline in money rates were the principal factors in increasing the attractiveness to purchasers of high-grade bonds. Bonds of the larger cities which for several months have been offered at prices yielding over 5 per cent are now selling on an income basis of 4½ to 5 per cent, with the demand greatly exceeding the supply. Indications are that municipal bonds will increase rather than decrease in value during the next two or three months.

The Uselessness of Excessive Wages

In a recent steam shovel job in New York City the shovel runner was able to demand and received a wage of $164 per week, including overtime. As this was more money than he was capable of intelligently or usefully expending, he proceeded regularly every Saturday night to purchase a costly silk shirt which he wore the following day and on Monday cut off the sleeves and used it for a working garment during the week.

Without experience, responsibility or efficiency justifying a half even of the enormous wages which he received, he was incapable of making a proper use of them and they simply afforded him opportunity for conspicuous extravagance even if he avoided vicious use of the money. It might be

supposed that, realizing the profitable nature of steam shovel work, he would have saved his earnings with the ambition of purchasing a steam shovel and thereby establishing himself in a safe and lucrative business; but such does not seem to be the case and this instance only illustrates the universal truth that any large excess of wage paid over what is actually earned and the man is accustomed to receiving generally results in serious injury to him and to the public, not only in encouraging vice and extravagance but in giving an opportunity for idleness and almost inevitably causing dissatisfaction, restlessness and unreliability; there remaining no justifiable reason for paying a man money that he cannot properly spend.

Highway Funds For 1921

Figures at hand indicate that there will be available next year for highway purposes, federal, state and county founds totaling $1,500,000,000. It is not anticipated that this sum or anything like it will be spent in 1921, but the amount will be available and as much of it can be spent as conditions will permit the use of to advantage.

In November the voters approved the issuing of $60,000,000 worth of bonds by Missouri, $75,000,000 by Minnesota, $50,000,000 by West Virginia, $5,000,000 by Colorado and $2,000,000 by Idaho. In Virginia an act was approved by the voters permitting the legislature to fix the amount of a highway bond issue not to exceed $50,000,000. In Kansas an amendment to the constitution was adopted permitting the state to pay one-fourth of the cost of road construction, such cost not to exceed $10,000 a mile or more than 100 miles in any county. California had previously authorized the issue of $40,000,000 of highway bonds at 4½ per cent, but the bonds could not be sold at that rate of interest this year, and at the recent election the voters approved the proposal to permit the rate to be raised sufficiently to sell the bonds, with a limit of 6 per cent. New Jersey voted $29,000,000 in bonds to pay that state's share of the cost of the vehicular tunnel beneath the Hudson river.

In four states proposed highway bond issues were defeated. A $20,000,000 bond issue in Florida and $30,000,000 bond issue in Washington were defeated because it was the intention to use motor vehicle registration money to float the bond issues, and this was opposed. Montana rejected a $15,000,000 bond issue and New Mexico a $2,000,000 bond issue, the latter presumably because it had been opposed by officials as unnecessary.

During 1919 California voted $40,000,000, as already stated, Oregon voted $12,500,000, Nevada $1,000,000, South Dakota 4,500,000 Wyoming $2,800,000, Maine $10,000,000, Michigan $50,000,000, and Utah $4,000,000. Comparatively little of this total of $124,800,000 voted in 1919 has yet been spent.

In 1920, in addition to the sums voted at the November elections as stated above, Alabama authorized $25,000,000, Oregon $10,000,000, and Maryland $3,000,000.

In addition to the state funds, there will be about $160,000,000 of the federal aid road funds which is still available. More than $350,000,000 was provided this year by counties of 32 of the states where the county is the principal unit of road building. The amounts appropriated this year by the various counties are shown in the accompanying table. Perhaps some of this has already been spent, but on the other hand there have probably been other sums provided for by bond issues or other methods of raising funds which have been omitted in the tabulations.

Alabama	$5,000,000
Arizona	8,400,000
Arkansas	2,400,000
California	24,635,000
Florida	1,515,000
Georgia	15,245,000
Indiana	7,373,000
Illinois	8,862,845
Iowa	18,475,000
Kansas	50,000
Kentucky	1,700,000
Louisiana	5,850,000
Michigan	2,300,000
Minnesota	12,800,000
Mississippi	15,773,000
Missouri	13,504,000
Montana	6,283,000
Nebraska	3,000,000
Nevada	1,200,000
New Mexico	200,000
North Carolina	13,609,000
Oklahoma	1,158,000
Oregon	9,696,704
Pennsylvania	21,337,553
Rhode Island	8,500,000
Tennessee	7,185,000
Texas	86,023,000
Vermont	2,766,000
Washington	8,225,000
West Virginia	7,039,200
Wisconsin	36,525,000
Wyoming	2,800,000

The above figures total to something over $1,000,000,000. In addition to them there are large sums of money previously appropriated and still available to be spent by a number of the states prior to 1919, such as the $60,000,000 voted by Illinois and $50,000,000 by Pennsylvania in 1918, the amounts to be spent by Massachusetts, New York and other states with large highway construction programs. Also most of the larger cities have extensive paving programs for next year made necessary by the postponement of desirable work during the past year or two of high prices. An estimate based on figures at hand gives the total of these sums available for expenditure at half a billion dollars, which will be spent as soon and as quickly as conditions will permit the construction to be carried on.

Sub-Surface Sewage Disposal

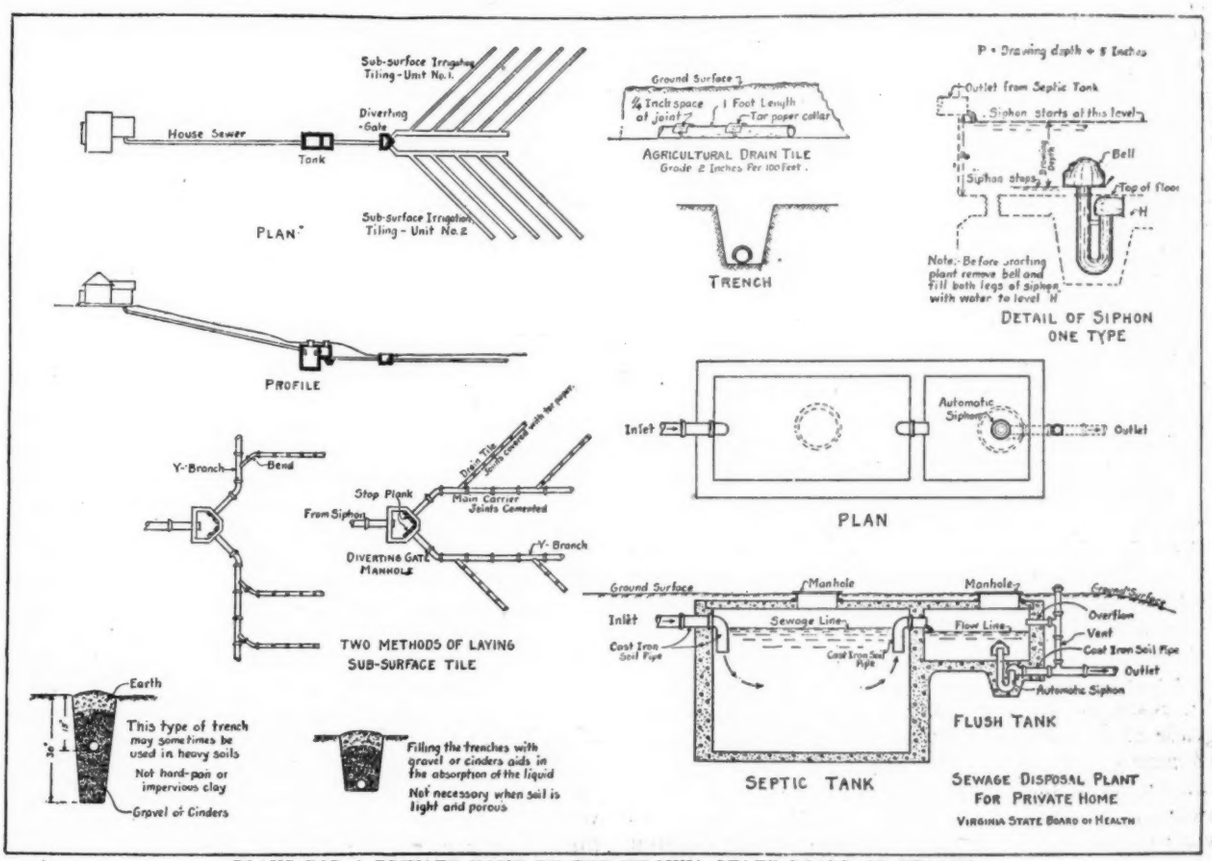
By W. A. Hardenbergh

The author has compiled and compared the recommendations of a number of state boards of health and other authorities on the structural details of sub-surface plants as well as area and kind of soil necessary to secure satisfactory results.

In the ordinary small home sewage treatment plant—and in many school and institutional plants as well—it is impossible to expect that very much supervision, care or maintenance will be given after installation. The septic tank works very well under these conditions, better, perhaps, than might be expected; but the final disposal of the effluent is a considerable problem. Sub-surface irrigation is usually the solution for those cases where contact beds, sprinkling filters, or sand beds cannot be used on account of the neglect that is almost certain to be their share after they have been turned over to the owners.

Properly installed, sub-surface drains give considerable satisfaction. Improperly installed, a corresponding amount of trouble and nuisance may be anticipated. Very many local, and other, considerations are important in determining what is proper or improper installation. No case can be judged beforehand, but to give a general review of the field, recommendations of various state boards of health and other authorities are given herewith.

Louisiana, in the Quarterly Bulletin of the State Board of Health for May, 1913 (the latest available) gives the following recommendations: The distribution of the sewage through the soil is best effected by lines of tile drains laid with uncemented joints about 12 to 18 inches below the surface of the ground. The lines need not be straight, but should follow the contours of the ground, with a fall of 2 or 3 inches per hundred feet. The area required for this treatment depends, of course, on the nature of the soil, and may be determined by allowing one-half foot of pipe per gallon of flow per day in sandy soil, and one foot in fairly dense loam. In dense or clayey soils the absorptive power may be increased by excavating trenches two feet wide and a couple of feet below proposed grade and



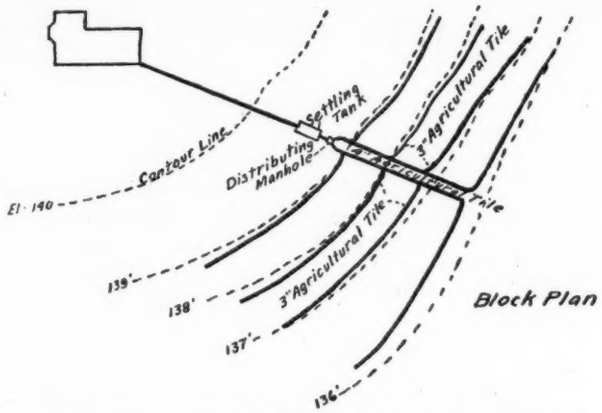
PLANS FOR A PRIVATE HOME BY THE VIRGINIA STATE BOARD OF HEALTH

filling these with a porous material, such as cinders, gravel or sand. In extreme cases it may be necessary to underdrain the lines with tile drains. In very sandy soil, one line may be enough, but it will usually be better to place the lines three feet apart, or five feet in dense soils. The ends of the pipe should be turned upward to permit the flow of air. Two systems of drains should be laid and operated alternately, a week at a time. In sandy soil, tarred paper or pieces of pipe of a larger diameter should be placed around the joints. These lines of tile drains should not be laid within a hundred feet of a well.

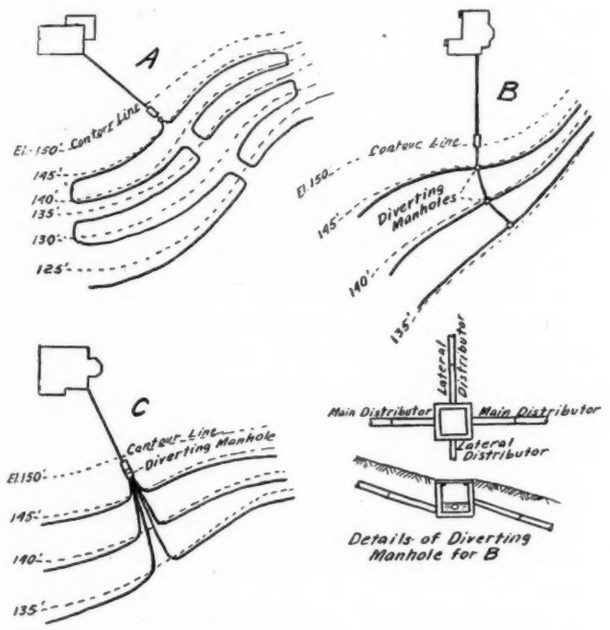
The Virginia Health Bulletin of March, 1917, says: The area selected must have a sandy or gravelly top soil. When the soil is heavy clay or impervious, or where the ground-water level is only 2 or 3 feet below the surface, the system will not be satisfactory. Much depends upon how accurately the distributing lines are laid. The grade should be 2 inches per 100 feet. Parallel lines are usually spaced 4 feet apart. If the area is not to be plowed, the depth of the trench may be reduced to 12 to 15 inches. The 3-inch tile is usually best unless the soil is heavy, in which case the 4-inch size is often used. A space of one-fourth inch is left at each joint and, to prevent the earth falling in, the joint is covered with tar paper or a special earthenware cap. Gravel or cinders may be placed over the joints. A double system of underdrains is advocated. The amount of tiling required depends on how great is the volume of sewage and how porous the soil. In sandy or very porous soils, provide about 25 feet of tiling per person for each unit. On this basis, for five people 125 feet of tile in each unit (or a total of 250 feet) would be required. In more compact soils, a greater amount must be provided, often as much as 50 to 75 feet per person per unit. The lines are usually from 50 to 100 feet in length. If the soil is quite heavy, the trenches may be filled with cinders or gravel to within 3 inches of the top.

New York recommendations, made in 1918, by Theodore Horton, state sanitary engineer, state that, while no definite rule can be given, 10 to 20 feet per person will usually suffice in sandy soil; 40 to 60 feet per person in light loamy soils; but in clayey soil the method is not applicable. Three or four-inch lines are recommended, laid 12 to 15 inches beneath the ground, with open joints, and the tile lines laid not closer than 4 feet. The grade is suggested as 6 inches per 100 feet. Especial care is recommended in protecting the joints, so that the pipe may not sift full of earth or sand. Stress is also laid on the arrangement, especially where the grade is steep, and the recommended arrangements are shown in the accompanying sketch.

Hoskins and Young, writing in a 1918 issue of the Kansas State Board of Health recommend a grade of 3 inches per 100 feet, and depth of about 18 inches. If the soil is open and sandy, 200 feet will be sufficient for the ordinary residence, while if the soil is of closer texture, 300, 400 or more feet will be necessary. The system is not well adapted



PLAN FOR SUBSURFACE IRRIGATION ON GENTLY SLOPING GROUND
By New York State Board of Health



SUBSURFACE IRRIGATION SYSTEM ON STEEPLY SLOPING GROUND
By New York State Board of Health

to tight and retentive clay soils, though it has been used successfully for a time under such conditions. One or more lines of tile may be used. In case more than a single line is used, great care should be taken to see that each line receives its proper share. A desirable, though costly, modification suitable for tight soil consists of a trench about four feet deep, filling the lower three feet with cinders or gravel, and then laying the 3-inch tiles at the surface of this.

The present attitude of the North Carolina State Board of Health is that conditions vary so much in the different portions of the state that any recommendations as to amount are too general to be of value. In a bulletin issued in 1912, one foot or slightly more of 4-inch tile for each gallon of sewage expected daily is recommended. In ordinary soil, 4-inch disposal tile may be used, while in loose, porous ground, 5-inch, or 6-inch, pipe works well. If a siphon is used, the capacity

of the tile line should be from 10 to 50 per cent more than the siphon.

Maryland recommendations, as given out in 1916, are as follows:

Persons	Feet, light soil	Feet, heavy soil
4	140	300
6	210	450
8	280	600
10	350	750

Warren, writing in the year book of the Department of Agriculture, recommends an outlet for each 30 gallons of siphon dose, with the ends of the lines practically flat. The ends of the runs should be vented. The capacity of the tile lines should about equal the siphon discharge.

Frank and Rhynus, of the United States Public Health Service, recommend that the tile system be divided into two parts, issuing from opposite sides of the control box. The piping should be of 3-inch agricultural tile with ends spaced about one-fourth inch apart. The length of trench necessary per person varies with the porosity of the soil, but 40 lineal feet per person is suggested as a conservative figure. Where the soil possesses extreme porosity the tile may be laid directly in the soil, but where practicable, and where there is the slightest question as to the degree of porosity of the soil, it is suggested that the layer of broken stone or gravel shown in the illustration be used in order to increase the life of the trench. The flat board covering the pipe is intended to prevent the upper layer of the soil refill from finding its way into and clogging either the tile piping or the lower portion of the trench. The tile line should be laid out to follow the contours and should be carefully laid with a grade of about 2 inches per 100 feet.

SECTION OF TILE TRENCH
By U. S. Public Health Service

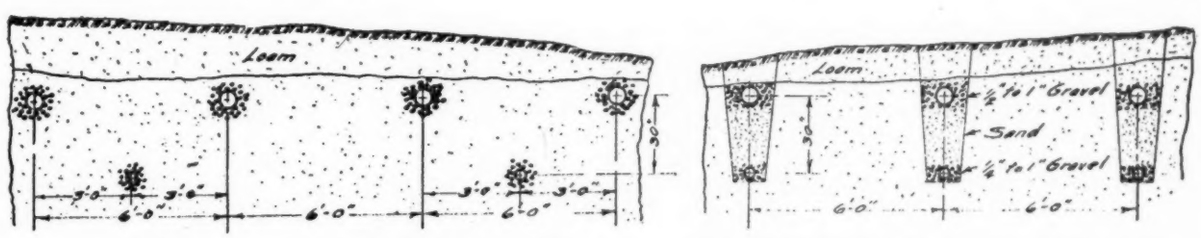
Washington (1916) recommends 160 feet per family, with a fall of 2 to 3 inches per 100 feet. Mississippi (1913) recommends a fall of one inch in 25 feet. Illinois (1916) suggests that tile lines under average conditions in that state will require about 100 feet of length per each member of the household. Gillespie (1918) gives the requirements as 40 to 100 feet of tile line per person, with no individual line over 100 feet long, and no lines within 6 feet of each other. The fall is given as 2 inches per 100 feet.

The 1919 issue of the Maine Health Bulletin carries recommendations by Dr. H. D. Evans, as to treatment of septic tank effluent. He states that in sandy or gravelly soils, which are the best for disposal of tank effluents, there should be allowed at least 35 feet of open-joint lateral per person. As closer grained and more compact soils are employed, the length per person must be increased, even up to 80 or 90 feet. In clay formations a modification of the system must be used. The laterals should be spaced at least 6 feet apart, and preferably double that distance. The depth of tile line should not be over 12 inches, as the bacterial activity of the soil decreases rapidly below that depth. Where only clay is available, it is necessary to make an artificial filter bed. Trenches 42 inches deep are dug and filled to within a foot of the top with cinder or other porous material. Sometimes a second tile line in the bottom is needed to carry away the effluent.

Ohio (1916) recommends a double system, each part connected to its own siphon. Each part should have a capacity at least 10 per cent in excess of the effective capacity of the dosing chamber. The distributing lines may be 6 or 8 inches in diameter, preferably the latter, to reduce the cost of trenching. The use of 6-inch tile will probably lengthen the life of the system, but increase the initial cost. For the distributing lines, hard-burned tile is preferable. These should be laid with one-quarter-inch joints and surrounded with one-quarter to one-half-inch gravel. It is advisable that the tile be covered with at least 12 inches of loam or soil. Small strips of heavy paper may be placed over the upper portion of each joint to prevent the washing of the finer material above into the distributing tile. About three feet beneath the distributing lines, 4-inch drain tiles are placed to prevent the accumulation of ground water in the filtering medium. The 8-inch tiles should be placed not less than five feet apart, and the 4-inch drains midway between. The distributing tile should be laid on a slight grade of not more than 3 inches per hundred feet.

Florida has been considering proposals to base the amount of tile on the number of people per acre, with tile lines spaced six feet apart. This has not yet been adopted. Florida is very largely a sand formation, and probably more than any other state could successfully apply a fairly general rule. It is suggested to base the rules on a maximum of 1,250 persons per acre.

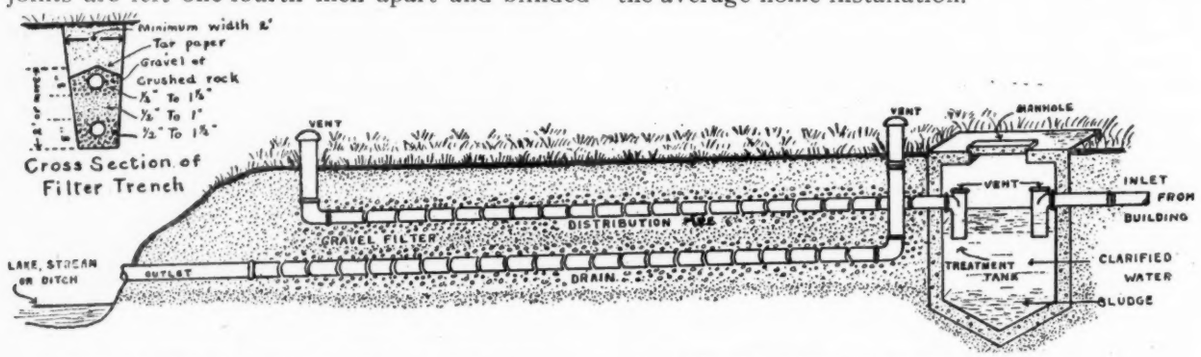
Wisconsin gives most detailed requirements. For a small home, an absorption trench is recommended. The distribution pipe should be laid



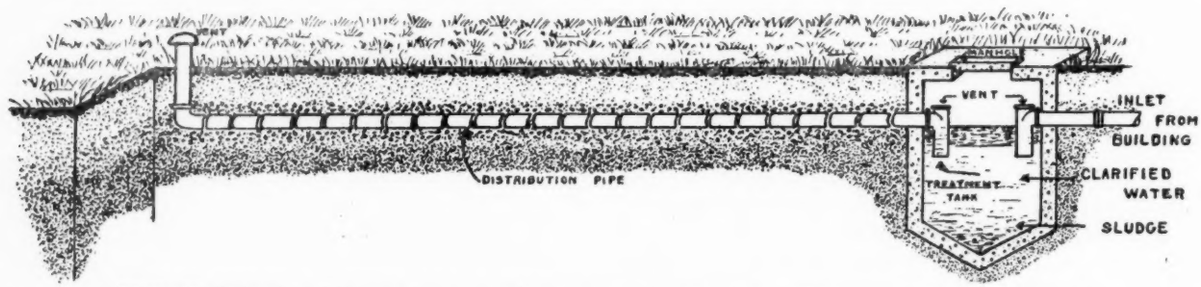
ABSORPTION FIELD IN POROUS FORMATION ABSORPTION FIELD IN SEMI-POROUS FORMATION
SECTIONS OF ABSORPTION GROUNDS, SHOWING DISTRIBUTION TILE AND DRAINS.
By Ohio State Board of Health, Division of Sanitary Engineering.

with a grade of 4 inches per 100 feet, and should be either a 5-inch or a 6-inch tile, laid with open joints, three-eights of an inch apart. A layer of crushed rock or gravel, one-half to one and a half inches in diameter, should surround the pipe. This material should be covered with tar paper. The absorption trench should have a length of 5 to 10 feet for every 30 gallons of liquid to be disposed of per day. Where a dry well and underground filter are combined, the amount of tile required is 5 to 10 feet for every 50 gallons of sewage per day. This underground filter consists of a trench, having a bottom drain, filled with cinder or other porous material, on top of which the effluent line discharges. With the drainage tile disposal system, which may be used where the ground for a depth of 3 to 6 feet is sandy and gravelly, the lines must be laid 15 feet or more apart, with a grade of 2 inches per 100 feet. The joints are left one-fourth inch apart and blinded with burlap or broken stone. The amount of tile laid should vary from 20 feet to 100 feet per person, depending upon the character of the soil.

It is impossible to generalize for conditions vary so much, even in all-sand sections. In general it is economy in the long run to put in plenty of tile. In tight soils, it may be cheaper to use the filter trench. This, as recommended by the writer (and he usually recommends it in preference to the ordinary system in the clay soils of the Carolinas), consists of a trench about four feet deep and two feet wide. A small drain is laid in the bottom, to carry the effluent to a nearby ditch, stream, or drain, and the trench filled, to within a foot of the top, with cinder, gravel, or broken stone. The effluent line is laid on top of this. Ends of both lines are vented. A very good effluent is usually secured. About 3 to 5 feet of this will usually be sufficient for each person, in the average home installation.



SEWAGE DISPOSAL SYSTEM FOR A SMALL HOME—TANK AND UNDERGROUND FILTER, WISCONSIN



SEWAGE DISPOSAL SYSTEM FOR A SMALL HOME—TANK AND ABSORPTION TRENCH, WISCONSIN

New Orleans Waterworks Notes

Some interesting features of the operation of this system last year, especially the purification plant. How the death rate has fallen.

New Orleans, La., like other cities, suffered in the upkeep of its public services because of material and labor prices and conditions during the year 1919, the report for which year has recently come to hand. The pumping plant has reached the practical limit of its capacity and the distribution system needs to be not only extended but also increased in capacity by the addition of one or more large mains. The quantity of water treated for consumption increased from 34,360,000 gallons per 24 hours in 1918 to 38,719,000 in 1919.

PURIFICATION

During the year the cost of operating the purification station at Carrollton was $118,947, or $9.04 per million gallons. This was divided as follows, the items being the average cost per million gallons treated: Labor, attendance and supervision, $3.42; labor, unloading, crushing and storing chemicals, $.59; lime, $3.26; iron, $1.07; liquid chlorine, $.14; supplies, tools, car fare, telephone, ice, etc., $.27; machinists' labor furnished by pumping station, $.08; labor and material fur-

nished by pumping station for power, heating and lighting, $.23. In addition to this, $3,298 was spent in betterments and additions, $11,275 in care of park and grounds, and $122 for special war protection.

At the Algiers purification station, the cost per million gallons was $25.59, of which labor, attendance and supervision cost $18.23; lime, $3.70; iron, $1.22; hypochlorite of lime, $.56; labor and material furnished by pumping station for power, heating and lighting, $.78; machinists' labor furnished by pumping station, $.14.

All figures for cost are exclusive of interest and depreciation charges and pro rating of general and overhead expenses. The figures of cost per million gallons are based on the actual quantity of water treated during the year as shown by corrected venturi meter readings, namely, 13,158 million gallons, exclusive of charges for high and low-lift pumping. Wash water was estimated to cost 7.02 cents per million gallons of water filtered. Cleaning reservoirs cost 9.06 cents per million gallons of water filtered, excluding treated water wasted in draining reservoirs for cleaning. The total gross cost of delivering filtered water to the distribution system at the plant, exclusive of interest and depreciation charges, but including cost of pumping as well as purification, was $20.37 per million gallons, or $21.54 if betterments and care and maintenance of the park and grounds are included.

At Carrollton the wash water used varied from 0.1 to 1.4 per cent, averaging 0.35 per cent. At Algiers the wash water varied from 0.2 to 2.7 per cent, averaging 0.6 per cent. At Carrollton the average amount of lime used was 4.60 grains per gallon and of iron was 0.69 grain, this being the least amount of lime and the largest amount of iron used during the past five years. At Algiers the average amount of lime used was 5.06 grains and of iron 0.94 grain.

The results obtained by softening and purification are indicated by the following figures (in parts per million), the first in each case being before treatment and the second after treatment. Nitrogen as albumenoid ammonia, 0.350 to 0.035 (free ammonia, nitrites and nitrates were unchanged). Oxygen consumed, 7.0 to 2.15; chlorine, 9.65 in each case; alkalinity, 97 to 41; incrustants, 22 to 25; suspended solids, 650 to 0; dissolved solids, 190 to 100; half-bound carbonic acid, 42 to 0; free carbonic acid, 8 to 0; oxygen, 9 in each case; color, 10 to 5; turbidity, 600 to 0; silica, 11 to 10; iron oxide, 0.13 to 0.05; calcium, 38 to 15; magnesium, 8 to 3; sulphuric anhydride, 19 to 21; bacteria in gelatin at 20 degrees, 2600 to 31; bacteria in agar at 37 degrees, 1900 to 17.

In cleaning the reservoir system at Carrollton 150,000 cubic yards of wet mud was removed, which is estimated to be equivalent to 50,000 cubic yards of dry material. The removal of this cost $2,581 for labor and the use of water of a calculated value of $1,231, or a total cost of $3,812, or $.29 per million gallons of water treated, or 8.4 cents per cubic yard of dry material removed.

METERS

During the year, 64 per cent of the total consumption was recorded by meters. It was estimated that about 20 per cent additional was passed by the meters but unrecorded and that the remaining 16 per cent was used for sewer flushing, street sprinkling, fire houses, unauthorized uses, leakage and waste from the distribution system and other minor uses and losses. On January 1, 1920, there were 55,196 meters in use, 328 of which had been manufactured by the sewerage and water board of the city. Of these latter, 178 were 4-inch and 131 were 6-inch; one was a venturi, 231 were underwiter meters, and 96 were for special service. Of the total number of meters 460 measured free consumption, 123 being on schools, 53 on asylums, 51 on engine houses, 46 on water troughs, 44 on parks, 30 on municipal buildings, 29 on hospitals, 27 on markets, 26 on Sewer and Water Board services, 19 on police stations, and 12 on libraries. The average amount used by each of these was considerably larger for hospitals than any other service, with police stations and municipal buildings next, and asylums not far behind. The total consumption of these free consumers for the year was 680,045,000 gallons.

During the year 6,044 small meters were repaired and 444 large meters were inspected and repaired in place. Most of the meters have been in service for over five years and it is expected that the department will have to repair between 10,000 and 15,000 meters each year in the future, and work had been begun upon a new meter house and an increased testing equipment to meet this requirement. In addition to repairing, 2,669 meters were tested, the greater majority of these being 5/8-inch, the sizes including two 12-inch and one 16-inch. The cost of testing meters was $6,459 and of repairs and maintenance, $14,421. In addition there was $7,913 of department expenses, overhead expenses and expenses for the yard, stable, team, auto and tools chargeable to this service.

RESULTS OF DRAINAGE, SEWERAGE AND WATER SUPPLY

A table is given in the annual report showing the effect of the sewerage and drainage and public water supply upon the health of the city. The 40 years from 1880 to date is divided into 10-year periods. In the first decade from 1880 to 1889, inclusive, there was no adequate drainage, foul gutters and unscreened cisterns were everywhere and mosquitos abundant. During the second decade the conditions were the same, but with cesspools increasing and overflowing often into the gutters. From 1900 the drainage commenced to improve the conditions of soil saturation and after 1906 sewers also acted to drain the soil and to receive house connections. By 1910, 20 per cent of the premises were connected with sewers and 38 per cent were connected with the waterworks system. Following that date, further connections with both systems increased rapidly and the drainage improved. By 1919 practically all the well-built-up areas were drained, 93 per cent of the premises were served by sewers and 96 per cent by water. We have, therefore, the first two decades increas-

ing in unfavorable conditions and the last two decades with increasingly favorable conditions.

The death rates per 100,000 from malaria for the four decades were 156, 104, 26 and 7, respectively, which had fallen to 4 in 1919. The rates per 100,000 for typhoid were 21, 39, 38 and 21, respectively, with 13 for the year 1919. The death rates per 1,000 from all causes have steadily fallen, being 28.6, 27.2, 22.6 and 20.6, with the rate for 1919 being 18.8.

The most remarkable of the above figures are those for malaria, which figures were decreased first by screening of cisterns and other precautions, but the fall from the average of 104 to an average of 26 in 10 years was due largely to the drainage of the soil. The reduction from an average of 156 to 4 in 1919 is one of the most remarkable on record in this country for any disease. The typhoid rate reduction is not so favorable, having fallen from 39 before the sewers began being used to 21 during the last decade. Even the rate for 1919 shows room for improvement.

Construction Questions Answered

Suggestions as to methods, "wrinkles" and appliances that may be used to overcome difficulties arising in construction work. We invite questions concerning such problems that may arise from time to time in the experience of any of our readers. Answers prepared by competent authorities will be published promptly. It is hoped that others who have solved similar problems differently will send us their solutions for publication also; or describe new "wrinkles." If it is only a new way to drive a nail, it may help some one.

Driving Sewer Tunnel in Rock

CITY ENGINEER'S OFFICE

November 13, 1920.

Editor of PUBLIC WORKS,, New York.

Dear Sir:

This city is planning on building a tunnel sewer 6 feet in diameter and 800 feet long through solid limestone at a depth of 25 feet beneath the surface. As tunnel work is unusual and perhaps occurs once in a lifetime in practice of an engineer, which is the case with me, I am seeking information in regard to what equipment is needed for a job of this kind and also some idea of how much work or number of lineal feet of tunnel can be accomplished in a certain time so that I can make an estimate that will be approximately correct, and therefore kindly ask for a little help through your information bureau.

My intention is to sink shafts about 200 feet apart and work two gangs of men tunneling toward each other.

For your convenience and to take up as little of your time as possible, if you will kindly answer the following questions by filling in the blank spaces.

What is your opinion as to what power is best to use to operate the rock drills, steam, compressed air or electricity?

How many men can conveniently work in each gang?

How many power drills would you advise to use?

Approximately how many lineal feet of tunnel can be driven in 9 hours?

Answers to the above questions will be greatly appreciated as they will be a great help to us.

Yours truly,

CITY ENGINEER.

To this we replied as follows: As we do not know the character of the limestone formation, whether it is regular or irregular, hard or soft, or how it breaks with explosive, which can only be determined by trial, our reply is only approximate and is based on the assumption that the stone is medium hard and homogeneous and that conditions are normal.

No. 1—For tunnel construction there is practically no choice; compressed air drills should be used.

No. 2—A maximum of four men is required in each gang.

No. 3—The most desirable equipment for drilling a small tunnel heading like this is two Drifter drills mounted on columns, although equivalent work can be done with four Jackhammer drills.

No. 4—With this equipment under ordinarily favorable conditions drilling for a 6 linear foot cut can be made in one 8-hour shift, and the muck can be removed in another 4-man 8-hour shift; but as considerable time is necessary for tunnel ventilation it is impracticable to run a third shift in 24 hours. And as 6 feet is a desirable limit for the depth of holes, all the work can be accomplished in 8-hour shifts.

The number of men and drills above estimated is for a single heading which, allowing 25 working days per month, would require between 5 and 6 months to drive the tunnel from one portal to the other. If driven simultaneously from two portals the time would be 3 months or less; if from two portals and one shaft, four headings, only about 6 weeks, exclusive of shaft sinking, would be required; and if headings were driven simultaneously in opposite directions from the portals and from the three shafts mentioned, the actual time should be reduced to about three weeks at the expense of a greatly increased outlay for drills, air compressors and other equipment.

The equipment necessary for driving one heading would suffice for sinking one shaft, on which operations could be maintained continuously for three 8-hour shifts daily, giving a progress of 7 or 8 linear feet per day.

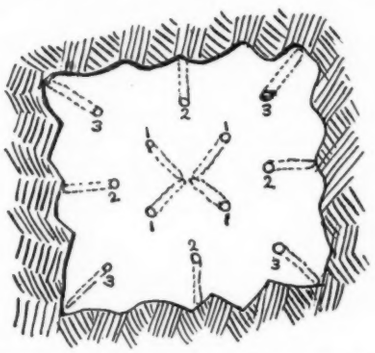
These specific answers were supplemented by the following general discussion of the subject.

NUMBER OF SHAFTS AND HEADINGS

The rapidity with which the tunnel can be driven depends almost entirely on the number of headings provided, which may be any number from one up, according to the urgency of the work and the amount and character of the equipment on hand or that can profitably be secured for this piece of work.

If no great urgency is involved, the work can be entirely completed from a single heading with the minimum cost of equipment and with very little extra cost for labor or superintendence. If made in this way it is also possible to utilize drills and compressors of a type that, although not of the highest possible efficiency for this work, are still effective tools, have the merit of being very light and portable and are adapted to many kinds of ordinary construction work that would make them available for all sorts of city requirements, thus being valuable tools to keep in stock and very easily purchased or sold in the market.

A tunnel of this length, under ordinary conditions could be advantageously driven from the two portals without the use of shafts or it could be driven simultaneously from the portals and from two headings at the foot of one shaft, or from four headings at the feet of two shafts, or from six headings at the feet of three shafts, making a total of eight headings, which would greatly expedite the work but would involve the extra labor for sinking the shafts and a considerable sum for the purchase or the rental of eight



LOCATION OF HOLES IN 5x5-FOOT SHAFT

times the minimum amount of equipment. These are matters wholly of expediency, to be determined in every case by a fair consideration of the local requirements.

SHAFT SINKING

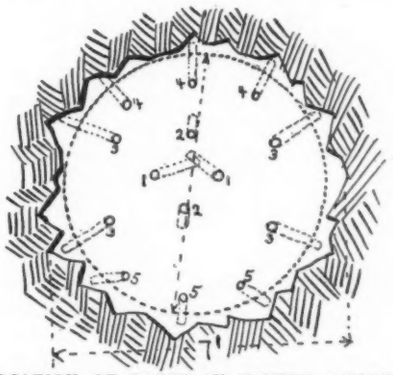
In this case the depth below the surface is so small that each shaft should be sunk in three or four days, involving a direct cost of perhaps $300 minimum for labor and supplies, besides which it would be necessary to provide hoisting equipment and maintain it at the shaft during construction. The equipment for excavating the shaft would be the same as that required for driving one heading and would, of course, be used for that purpose after the completion of the shaft.

For such a short shaft serving so small an amount of tunnel excavation, a minimum 5 x 5-foot rectangle would suffice, which would only provide clearance for the hoisting bucket in which the men would have to ride up and down, thus suspending the handling of material whenever entrance or exit was required.

This shaft would require about 12 holes arranged and inclined as indicated in the diagram. These holes, about 6 feet long in vertical projection, might have actual lengths of 6 to 7 feet and would be expected to break rock to a depth of about 5 feet. They can be drilled most advantageously by three DCR-13 Jackhammer drills weighing 55 pounds each, and requiring three men and a helper to operate them and a shift of three muckers to remove the rock. As no time is required for ventilating the open shaft, the work can proceed continuously day and night.

The Jackhammer drills are particularly convenient for cutting asphalt and concrete pavement, for block drilling, occasional blasting and various purposes and can be operated by a small size portable compressor. They are not, however, as suitable for drifting the tunnel headings, which can be best done with two drifter machines mounted on columns which have standard lengths of 6 feet or 8 feet, but can be ordered of any required length. For shaft sinking, the two drifter drills can be mounted on a column set horizontally. In either case, one extra drill should be provided to be held in reserve while the others are operating.

Each drill requires a water pressure connection for the feed and a 50-foot hose connection for air pressure. For three drills there should



LOCATION OF HOLES IN TUNNEL HEADING

be provided 12 sets of steels, so that one set can always be at the smith shop for sharpening. The steels should be 8 feet long and will penetrate about 7 feet and break about 6 feet of rock. The double taper cross-bits of 14 degrees and 5 degrees are made of hollow 1¼-inch round steel with lug shanks. Although a drill sharpening machine is desirable, for so small a job it will be possible and probably economical to sharpen them by hand in a blacksmith forge.

DRIFTING THE HEADING

To allow for a concrete lining with an interior diameter of 6 feet, the heading should be at least 7 feet in diameter and can probably be drilled with 14 holes arranged about as indicated in the diagram, but with their lengths and positions subject to change according to the nature of the rock and the manner in which it breaks.

The holes can be drilled with two drifter drills,

a special type of machine, sturdy, light and compact, and particularly effective for this kind of work. The drills should each be mounted on a separate column and be operated by a driller and a helper. Each drill will make from 40 to 50 linear feet of hole per 8-hour shift. Or the holes can be drilled by four BCR 4-30, or if necessary by the DCR-13, Jackhammer drills mounted two on each column.

In either case, the air supply required will be about 240 cubic feet per minute of air at from 70 to 100 pounds pressure, preferably 85 pounds. This can be supplied by a 12 x 12-inch electric stationary air compressor for three Jackhammer drills, and one Jackhammer and one drifter drill can be supplied by an 8 x 8-inch portable compressor delivering 170 cubic feet of air per minute. Such a machine is very popular for pavement repairs and miscellaneous work, operation of pneumatic tools, etc., and weighing only about 7,500 pounds, is easily portable. It is a complete unit operated by a gasoline motor and is mounted on wheels. The stationary compressor is belt driven, weighs about 6,600 pounds and requires a motor of 60 brake h. p. To provide a supply of from 200 to 300 feet per minute it should be equipped with a 36-inch receiver 8 feet long weighing 1,350 pounds. The compressed air should be discharged through a pipe 4 inches in diameter, which, however, can be reduced underground to 2 inches.

BLASTING AND MUCKING

The holes in the heading are divided into five groups which, in the diagram, are identified by numerals which also indicate the sequence in which the groups, as units, are to be successively fired. The No. 1 holes should be about 4 feet long parallel to the axis of the tunnel and should each be loaded with three cartridges. No. 2 holes 6½ feet long and No. 3 holes about 7 feet long, should each be loaded with six cartridges, No. 4 holes also 6 feet long with five cartridges and the No. 5 holes or lifters, about 7 feet long, with seven cartridges. Forty per cent dynamite should be used and the cartridges very well tamped.

In order to insure the successive firing of the different groups of holes, each group should have the fuses cut of different length, the longest, of course, for the last fired holes, and there should be slight irregularities, which naturally occur, in the length of the fuses in the same round, so that the separate explosions may be distinguished and counted, and in case any fail to explode the muckers can be warned of the fact and excavate carefully so as to avoid accidental explosions. With the ordinary fuse burning at the rate of about 1 foot per minute this detail is easily arranged.

Electric firing is somewhat more efficient than fuse firing but it involves the purchase of electrical equipment and the delay of wiring. The shots are all simultaneous, therefore producing the maximum effect, but if any charges are missed there is no way of determining it and the danger of their accidental discharge later is much greater than when fuses are used and a slight loss of efficiency is produced by the separate explosions.

Especial care should be taken in locating and drilling the No. 5 lifter holes, watching the effect of the blasts and varying them so that they will not only break the rock to the bottom of the tunnel, but will lift it up and throw up and backwards the muck accumulated from the previous discharges, thus facilitating the muckers' operations.

It will probably be found most advantageous to load the muck by hand into small dump cars on a narrow-gauge service track pushed by hand to the portal or shaft, but if the work is entirely from one portal or from two portals, making a longer haul, the work may perhaps be expedited by the installation of a tugger hoist, a compressed air machine occupying less than 2 feet in its dimensions which can be mounted on a column; it weighs only 350 pounds, exerts a 1,000-pound draw-bar pull and consumes about 150 cubic feet of air at 80 pounds per minute. This machine can handle the loaded cars on a moderate upgrade, and the empties can return by gravity, or it can be arranged with a return cable led around sheaves at both ends so as to haul the car in both directions, the return cable being carried under the tracks where it is out of the way.

If the tunnel is to be driven from only one heading, one extra drill should be provided as reserve, and more reserve drills (although not quite in proportion) will be required if it is done from several headings.

To operate four headings there would be required an XB-1 compressor with a capacity of 560 cubic feet of air per minute; to operate six headings an XB-2 compressor with a capacity of 835 cubic feet of air, or for eight headings an XB-2 compressor with a capacity of 1,100 cubic feet of air, all of these compressors being of the stationary type and being belt driven from steam, electric or gasoline motors, as found most convenient.

The description of equipment here given is intended merely to show what is required for the general operations, and to provide for comparisons. Therefore all of the items are selected for the sake of uniformity from the same catalog, that of the Ingersol-Rand Company, and are such as are generally recommended by that corporation for general construction of this nature under ordinary conditions. Corresponding equipment is, however, manufactured by other concerns and may be selected on its merits and to secure the greatest convenience and economy, or for special results if demanded.

Hetch-Hetchy Cost-Plus Contract

A rehearing of the Hetch-Hetchy cost-plus-fee contract of the Construction Company of North America in the suit by a taxpayer to prevent Auditor Thomas F. Boyle from transferring to the construction company an initial payment of $276,000 called for by the contract was denied on November 16 by the Supreme Court. The project had been halted for want of funds and this decision paves the way for a renewal of the work.

Recent Legal Decisions

CITY'S PROBITION OF GARBAGE REMOVAL EXCEPT BY LICENSEE OR CONTRACTOR

A restaurant keeper on behalf of himself and all others similarly situated in the city, sought to enjoin the city of Buffalo from enforcing an ordinance regulating the collection and transportation of garbage. The plaintiff had contracted with a farmer to collect his garbage, to furnish receptacles, to clean them, to return the silver and tableware found in them, and to pay the plaintiff a specified sum for the stock food taken away in them. The injunction was denied on the authority of City of Rochester v. Gutherlett, 211 N. Y. 309, 105 N. E. 548, where the New York Court of Appeals held that it is within the power of a municipality, not only to impose reasonable restrictions and regulations upon the manner of removing garbage, but also, if it sees fit, to assume exclusive control of the subject, and to provide that garbage and refuse matter shall only be removed by the officers of the city, or by a contractor hired by the city, or by some single individual to whom an exclusive license is granted for the purpose. The New York Appellate Division, which gives the decision, Eddy v. City of Buffalo, 184 N. Y. Supp. 51, adds: "If it (the ordinance) is not valid as against a restaurant keeper who transports his kitchen garbage through the public streets himself or by his employees, still the plaintiff is not in a position to raise that question, as the one who transports the garbage in the case at bar is not an employee, but a contractor."

MERE PHOMISE TO DO WORK FOR LESS THAN CONTRACT PRICE INEFFECTUAL

In an action for the balance of the contract price for excavating a drainage ditch a witness was allowed to testify that after the contract and bond had been executed and approved by the county court, and it had adjourned, he called the plaintiff's attention to certain omitted items of cost, whereby the apportioned assessment would not equal the entire cost of the project, and that the plaintiff said he would have to do the work for whatever was left. On appeal it was held that this was not admissible. McWilliams v. Drainage Dist. No. 19, 224 S. W. 35. It was an attempt to vary by parol a written contract. Such contracts as that in question cannot be modified by parol agreement. Besides, the contract was fully complete in every way, and there was no consideration for any such promise. In addition to this, it was not made to the opposite party to the contract, the engineer, nor was it reported to the court for approval and confirmation.

LIMITATION IN SPECIFICATION OF PAVING MATERIAL

The Illinois Supreme Court holds, Schoellkopf v. City of Chicago, 128 N. E. 337, that specifications for paving blocks requiring that the oil used for treating the blocks be a distillate obtained wholly and entirely by distilling coal tar and free from any adulteration and to contain a certain amount of tar acids, etc., were unauthorized and unlawful, under Illinois Local Improvement Act, par. 74, providing that all contracts for the making of any public improvement to be paid for wholly or in part by special assessment or special tax shall be let to the lowest responsible bidder and any provision which tends to restrict such competition is unlawful, where the specifications provided for an oil produced by but one of the many distillers of coal tar. The court said: "It is, of course, of much importance that a municipality should be able to obtain the best material and secure the best and most enduring improvement, but at the same time, under the statute, it must not be the victim of monopoly in procuring the best results."

CITY COUNCIL'S AUTHORITY TO ISSUE PAVING CERTIFICATES

The Minnesota Supreme Court, in Pike v. City of Marshall, 178 N. W. 1006, construes chapter 65, Minnesota Laws of 1919, to authorize the city council of a city of the fourth class not having a home rule charter to issue certificates of indebtedness to provide funds for the construction of a pavement without submitting the question to the electors for approval.

SUIT BY SUB-CONTRACTORS ON BOND OF CONTRACTORS FOR PUBLIC WORKS

Act of Congress, August 13, 1894, as amended by Act, February 24, 1905, provides that if no suit is brought by the United States on the bond of a contractor for public works within six months from the completion and final settlement of the contract, persons furnishing labor and materials, payment for which has not been made, may bring suit thereon in the name of the United States. It is held, United States v. Brown, 266 Fed. 555, that a suit so brought in conformity with the statute will not be stayed because of the subsequent commencement of a suit by the United States in another jurisdiction.

PROVISIONS OF CONTRACT AS TO EXTRA WORK MUST BE COMPLIED WITH

A contract with a city for laying a pipe line provided that extra work should be paid for according to a prearranged schedule of prices, if authorized by resolution of the board of trustees. It is held, Contra Costa Const. Co. v. Daly City (Cal.), 192 Pac. 178, that the contractor under such a contract cannot recover thereon for extra work performed without prearranged prices or the approval of the trustees. A promise by the city engineer in charge of the work to the contractor that the city would make a fair settlement for such extra work would not be binding on the city, unless the engineer had power to order the work. This would in effect change the contract and brush away the safeguards the city had placed therein for its protection.

NEWS OF THE SOCIETIES

Dec. 13-16—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual convention. Washington, D. C.

Dec. 16-17—THE KANSAS ENGINEERING SOCIETY. Annual meeting. Topeka, Kansas.

Dec. 18—MUNICIPAL ENGINEERS OF THE CITY OF NEW YORK. 16th annual dinner. McAlpin Hotel, New York City.

Dec. 27-Jan. 1—AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Smithsonian Institute, Washington, D. C. Chicago, Ill.

Dec. 28-31—AMERICAN ECONOMIC ASSOCIATION. Yale Station, New Haven, Conn. Atlantic City, N. J.

Jan. 19 — INTERNATIONAL CUT STONE CONTRACTORS' AND QUARRYMEN'S ASSOCIATION, Inc. Annual meeting. Congress Hotel, Chicago, Ill.

Jan. 19 — AMERICAN SOCIETY CIVIL ENGINEERS. New York City.

Jan. 25-27, 1921—THE AMERICAN WOOD PRESERVERS ASSOCIATION. Place of meeting to be announced later.

Jan. 25, 26, 27—ASSOCIATED GENERAL CONTRACTORS. Annual meeting, New Orleans. Secretary's Office, Washington, D. C.

Feb. 1-2—NEW YORK STATE ASSOCIATION OF BUILDERS. Convention. Rochester, N. Y.

Feb. 1, 2, 3, 1921—ONTARIO PROFESSIONAL MEETING in conjunction with the annual meeting of the Engineering Institute of Canada. Toronto.

Feb. 7—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention. Coliseum, Chicago. E. L. Powers, 11 Waverly Place, New York City.

May 17-19—NATIONAL FIREMEN'S ASSOCIATION. Twenty-third annual convention. Fort Wayne, Ind.

June 7-9—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting. San Francisco, Cal.

June—CONFERENCE OF MAYORS AND OTHER CITY OFFICIALS, State of N. Y. 12th Annual Conference. Elmira, N. Y.

June 6-10, 1921—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Cleveland, Ohio. Secretary, J. M. Diven, 153 West 71st St., New York.

FIRST MEETING OF THE AMERICAN ENGINEERING COUNCIL

At the first meeting of the American Engineering Council, twenty of the twenty-one engineering organizations which have become charter members of the federation were represented—also the other engineering organizations which are considering charter membership but which have not taken final action. The Kansas Engineering Society was the only charter member that did not send a delegate.

The meeting was opened on November 18 by Mr. Humphry. Temporary officers were appointed and the business meeting began with the appointment of various chairmen of committees. A report providing for the selection of members of the executive board by the division of the United States into six districts was given by L. P. Alford. The executive board was named. The date for becoming a charter member of the federation was extended to July 21, 1921. After much discussion, Washington was decided on as headquarters of the Council.

On November 19, the report of the nominating committee was made. Herbert Hoover was unanimously elected president; Calvert Townley, W. E. Rolfe, Dexter S. Kimball and J. Parke Channings were unanimously elected vice-presidents; and L. W. Wallace, treasurer.

The first meeting of the executive board of the Council was held on November 20, at which the board endorsed Mr. Hoover's plan for an investigation of industrial wastes, authorizing him to form an organization for that purpose. This investigation is to include, among other special lines of inquiry, the aggregate loss to industry and to the public occasioned by strikes and lockouts, and the unemployment caused by the shifting of industrial currents. The engineer, Mr. Hoover asserts in his first address as president of the federation's Council, is the best man to bring about co-operation among the country's great economic groups of special interests.

AMERICAN SOCIETY OF CIVIL ENGINEERSN

Two committees were appointed at the meeting of November 9 by the board of direction of the society to study the external relations of the society, the action being taken on account of the negative vote upon entrance into the federation after the positive vote in April regarding active co-operation with other engineering and allied associations for the purpose of promoting the welfare of the engineering profession. The first committee will consist of the younger members who will consider and make recommendations concerning the relations of the society to other engineering bodies. The second committee will consist of all living past-presidents of the society who will review and transmit to the board the report of the other committee. The first committee is to finish its report by January 1, and the second committee is to have it ready to submit to the board by January 17.

BROOKLYN ENGINEERS' CLUB

The informal meeting on December 2 was held under the joint auspices of the Brooklyn Engineers' Club and the Automotive Service Association of Brooklyn. The speakers of the evening were G. T. McFarland, president of the Automotive Service Association, who described "Automotive Electric Requirements and Its Service"; H. R. Cobleigh, secretary of the National Automobile Chamber of Commerce, discussed "Service from the Manufacturers' Standpoint," and D. P. Cartwright, of the North East Electric Co., showed a moving picture film illustrating "Starting, Lighting and Ignition."

THE NEW ENGLAND WATER WORKS' ASSOCIATION

The November meeting of the New England Water Works Association was held at Boston, Mass., on November 10. Several interesting papers were read. Among these were "Air in Gravity Mains," by J. E. Ledoux; "Standard Schedule for Grading Cities and Towns of the United States with Reference to Their Fire Defences and Physical Conditions," by John S. Caldwell; "Operations of a True Siphon on a Main Supply Pipe," by W. R. Brann and Charles W. Sherman; and "Water Waste Surveys in Boston," by Frank A. McInnes. An amendment to the constitution was adopted increasing the dues of regular members from $4 per year to $6. The further business of the meeting was the nominating of officers for 1921.

IOWA SECTION OF THE AMERICAN WATER WORKS ASSOCIATION

At the sixth annual meeting of the Iowa section of the American Water Works Association on November 5-6, at Iowa City, the following officers for 1921 were elected: Chairman, Francis D. H. Lawlor, Burlington; vice-chairman, J. Chris Jensen, Council Bluffs; directors, R. E. McDonnell, Kansas City, and Homer V. Knouse, Omaha; secretary, Jack J. Hinman, Jr. The next meeting is to be held in Omaha next October.

ASSOCIATED GENERAL CONTRACTORS

At a meeting of the executive board of the Associated General Contractors at Washington on November 16, resolutions were unanimously adopted endorsing the action of the Lockwood Committee in investigating the building situation in New York, and plans were laid for securing the co-operation of the United States Chamber of Commerce and other employers' associations in support of this.

TORONTO ENGINEERS HEAR ADDRESS ON ST. LAWRENCE CANALIZATION PROJECT

In conjunction with the Canadian Deep Waterways and Power Association, a public meeting was held on the evening of November 10 by the Toronto branch of the Engineering Institute of Canada in the Mining building of the University of Toronto to hear addresses on the proposed St. Lawrence deep-water route by O. E. Deming of Windsor, president of the Canadian Deep Waterways and Power Association; E. L. Cousins, manager of the Toronto Harbor Commission; and Alex C. Lewis, member of the Ontario legislature and secretary of the Canadian Deep Waterways and Power Association. After the addresses, general discussion was invited in which a great number of the large attendance present took part.

J. M. R. FAIRBAIRN TO BE NEXT PRESIDENT OF THE ENGINEERING INSTITUTE OF CANADA

The nominating committee of the Engineering Institute of Canada has, according to its usual custom, nominated but one candidate for the presidency, the nominee for next year being J. M. R. Fairbairn, chief engineer of the C. P. R. For each of the other offices two men have been nominated.

AMERICAN SOCIETY OF CIVIL ENGINEERS NOT TO BECOME MEMBER OF THE FEDERATED AMERICAN ENGINEERING SOCIETIES

In a letter ballot canvassed on November 8, the American Society of Civil Engineers, by a vote of 3,278 to 2,330, defeated the proposal that the society should become a member of the Federated American Engineering Societies, of which the American Society of Mechanical Engineers, the American Iistitute of Electrical Engineers and the American Institute of Mining Engineers have already become charter members.

NEW JERSEY HIGHWAY CONTRACTORS UNITE

Twenty-five contractors have co-operated in forming the highway Contractors' Association of New Jersey. The first meeting of the organization was held at the Trenton House, Trenton, N. J., on October 15. A meeting and banquet was also held on November 4, at which time the following officers were elected: President, J. F. Kelly; vice-president, Joseph Burke; treasurer, James Barrett; and secretary, Mr. Whelan.

CONSTRUCTION CONGRESS

At a meeting of the several representatives of contractors, sub-contractors, architects, engineers, and labor, held in Pittsburgh, October 2, the permanent organization of an executive committee to handle a Construction Congress was completed. Robert D. Kohn of New York was elected permanent chairman and Sullivan W. Jones of New York, permanent secretary. Plans were laid for calling a meeting of representatives of all elements in Chicago on or about February 1, 1921.

GENERAL MARSHALL MEETS CONTRACTORS IN TWENTY CITIES

To strengthen and develop the spirit of co-operation among general contractors throughout the United States, General Marshall began his active campaign as general manager of the Associated General Contractors with meetings of general contractors in twenty of the principal cities east of the Rocky mountains. At every city on his trip he has been met with most enthusiastic response from the leaders in the industry.

TORONTO BRANCH OF THE ENGINEERING INSTITUTE OF CANADA

At a meeting of the Engineering Institute of Canada on November 18, the question of zoning as a part of scientific town planning was discussed. A committee had been working on a report on this subject, but as the report was not completed in time, the evening's discussion was confined to a review of matters brought before the committee. The following points were emphasized: The benefits to be derived from zoning; the fact that each city in the province of Quebec has the power of planning and carrying out complete zoning systems; the results of traffic studies made by the Civic Transportation Committee of Toronto; and the Toronto Harbor Commission's activities in the matter of zoning.

THE OKLAHOMA CHAPTER, AMERICAN ASSOCIATION OF ENGINEERS

At a meeting of the Olkahoma chapter of the A. A. E., held at Oklahoma City on November 20, the subject of the danger to Oklahoma City's water supply resulting from recent floods in the North Canadian river was considered, and a permanent committee was appointed to give attention to the correction of the situation.

AMERICAN WATERWORKS ASSOCIATION, CALIFORNIA SECTION

The first annual meeting of the California section of the American Waterworks Section was held in San Francisco on November 13. Three papers of great interest were read, and several reports given. The business meeting was followed by a luncheon at the engineers' club and an automobile trip over the peninsula properties of the Spring Valley Co.

TEXAS SECTION, AMERICAN SOCIETY OF CIVIL ENGINEERS

At the fall meeting of the Texas Section of the American Society of Civil Engineers at Austin on October 20 and 21, the following officers were elected: President, J. H. Brillhart, Dallas; first vice-president, F. E. Giesecke, Austin; second vice-president, J. C. McVea, Houston; secretary-treasurer, E. N. Noyes, Dallas. A number of technical papers were then presented. A standing committee was appointed to work out details on a standard form of contract with arbitration clause and submit the same to the members by letter-ballot for approval. A committee on redistricting of the American Society of Civil Engineers reported in favor of the present District No. 11 and against any change. Committees were appointed to work on an Engineers' License Law and present the same to the legislature, and to bring in a resolution on the water power bill now before Congress.

PERSONALS

Fairchild, W. H., has resigned as city engineer of Galt, Ont., the resignation to take effect at the end of the year.

Brett, J. F., who since his return from abroad in March, 1919, has been assistant engineer in the Public Works Department of Montreal, has been appointed designing engineer of the Montreal Water Board.

Philips, Hector S., who before the war was in charge of the Sewer Drafting Section, Department of Works, Toronto, is now engineer of sewer design in the city engineer's office, London, Ont.

Zerbe, Luther K., of the firm of Zerbe & Pfouts, civil engineers and surveyors, who for the past twenty years has been engaged in municipal engineering, has been appointed assistant superintendent of the Canton, O., waterworks.

Calvert, Lt.-Col. L. L., has returned to the position which he held before the war, that of chief engineer with the Tidewater Building Co. of New York City.

Webster, George S., for many years chief of the Bureau of Surveys, Philadelphia, will shortly resign his position to become directing engineer of the Joint Pennsylvania and New Jersey Delaware Bridge Commission. The resignation will probably take effect some time in December.

Bloomquist, H. F., who at one time was engaged as city engineer of Ulm, Minn., and Mankat, Minn., and who later was appointed principal assistant engineer for the bureau of water, department of public utilities, St. Paul, Minn., has recently been appointed superintendent of the water department of Cedar Rapids, Ia.

Wells, Emery, who is considered a specialist on reinforced concrete construction, is now with Berkebile Bros., engineers, of Johnstown, Pa.

Ihrig, Howard K., formerly chief draughtsman, engineering works department, Dravo Contracting Company, Pittsburgh, Pa., is now in charge of the engineering department of the Heltzel Steel Form & Iron Company, Warren, Ohio.

Flanagan, C. D., Jr., is now engaged as engineer in the municipal service department of the Southeastern Underwriters' Association, Atlanta, Ga.

Smith, P. S., of the U. S. Geological Survey, and Holbrook, E. A., of the U. S. Bureau of Mines, have been appointed by the Interior Department to serve on the American Engineering Standards Committee.

Jones, H. S., valuation engineer of the Gulf, Mobile & Northern Railroad, has been appointed chief engineer, with headquarters at Mobile, Ala.

Babcock, Dudley P., formerly assistant engineer of the New York State Department of Highways, has been appointed assistant engineer, Bronx Parkway Commission, Bronxville, N. Y.

Williams, H. W., formerly assistant engineer in the electrical department of the Chicago, Milwaukee & St. Paul Railroad at Seattle, has been appointed special representative to the general superintendent of motive power at Chicago.

Mitchell, John S., formerly chief draftsman with the Niles Forge & Mfg. Co., Niles, Ohio, is now chief engineer and assistant manager of the Ohio Structural Steel Co., Newton Falls, Ohio.

Crumb, Edwin D., formerly in the engineering office of the Automatic Sprinkler Valve Co. of America, Youngstown, Ohio, has accepted a position as junior assistant engineer of the New York State Highway Department.

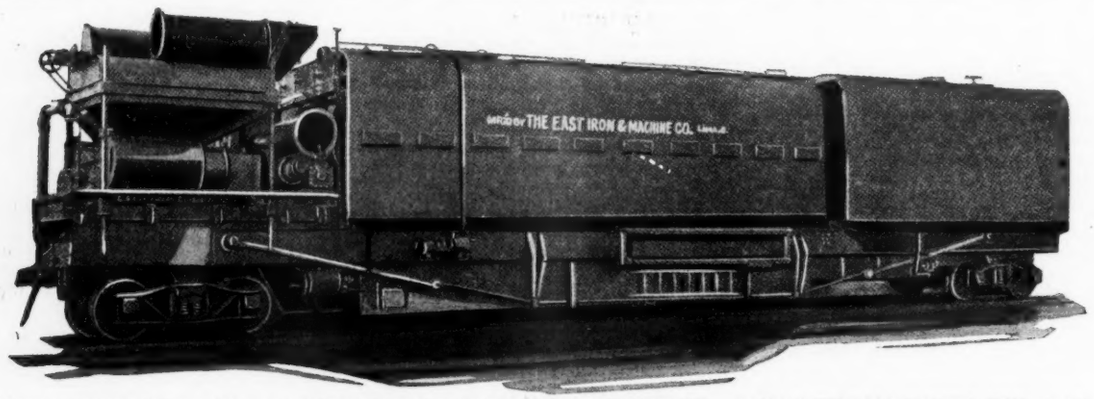
Moody, Walter D., managing director of the Chicago Plan Commission, with which he has been connected since 1907, died at his home in that city on November 21.

Bullock, Charles, contractor, of Brampton, Ont., died on November 15 at the age of eighty years.

Thomas, Chester A., engineer, died on November 11 at Dawson, Y. T., Canada. He was last connected with the Yukon Gold Co., Canada, for which company his most important activities were the construction and operation of several hydraulic mines, seven gravel dredges, three electric grain elevators, a 2,500 h. p. power plant with 5-mile water system and 50 miles of transmission lines.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Instal ations



NEW ASPHALT PLANT, 58 FEET LONG, READY FOR SHIPMENT. CAPACITY 3000 YARDS PER DAY

THE NEW MERRIMAN ASPHALT PLANT

The East Iron & Machine Company, which has been building the Merriman one-car steam-melting asphalt plants since 1905, announces that the improved Merriman No. 3 is now on the market, and several have already been sold.

The new plant, which has increased efficiency and is easier to transport and handle, is only 58 feet over all, and is the shortest complete railroad plant of its capacity on the market. The guaranteed capacity is 2,000 square yards of 2-inch topping, or 2,800 yards of asphaltic concrete, in a ten-hour day. Users of this plant are now laying over 3,000 yards of 2-inch topping in a ten-hour day.

The side girder sills are so constructed that they cannot sag or warp out of shape. The trucks are extra heavy, M. C. B. standard, with 6 x 11-inch journals, special hammered steel axles and chilled wheels. The 125-h. p. boiler is extra heavy, is a good steamer, and is very easy to clean. The power equipment is specially designed. The engines are of simplified construction, very heavy, and all parts are readily accessible.

The four melting kettles are constructed in one unit. Each kettle is equipped with two steam coils, made of heavy electrically welded pipe. These kettles are so arranged that air pressure can be used to facilitate discharge of the asphalt, and so that either air or steam can be used for agitation. Clean-out doors are placed at close intervals.

The patented sand drum is 5 feet in diameter and 25 feet long. No internal spiders are used, and four heavy I-beams act as spill plates and carry the sand so that it falls through the heat as the drum revolves. Spiral flights carry the material forward. The drum runs on special trunnions and a special riding ring, and is driven by outside gear segments. The capacity is approximately 25 tons per hour.

The mixer has a capacity of 12 cubic feet, is equipped with patented blades having renewable ends and can dump directly into motor trucks which run under the mixer platform.

The telescopic hot material storage bin holds 12 cubic yards or 15 tons, but can be easily closed down on platform without removing any parts.

The patented working platform, when extended for operation, permits trucks and wagons to pass under the mixer dump and is easily drawn within shipping length of the car and clears the end of the car frame.

Elevators on both sides of the plant feed the sand drum, so material can be stored on either or both sides. The hot material elevator is entirely enclosed in dust-tight sheet-steel housing, made in sections, which can easily be removed to facilitate packing for shipment. The fire box is arranged for burning coal, coke, wood or fuel oil, thus giving a choice of fuel at all times.

LITTLE WONDER TILE DITCHER

The Little Wonder tile ditcher manufactured by Edward Jeschke can be operated by either team or tractor power and rapidly cuts a clean, narrow ditch more uniformly and economically than it can be done by hand power.

It will cut from 2 to 3 feet deep at the rate of 1-3 mile per hour. With teams, it can be operated as fast as the horses can walk, digging easily to a depth of 30 inches. One of them was reported in two hours to have dug a trench that would have cost $42 if dug by hand.

INDUSTRIAL NOTES

The Austin Machinery Corporation, Chicago, Ill., has established ten primary district offices and warehouses and upwards of fifty subsidiary offices and agencies throughout the United States. Each warehouse carries a full stock of machines and parts.

Blaw-Knox Co., of Blawnox (Pittsburgh) has established a new sales district in the south, with headquarters at 408 American Trust building, Birmingham, Ala. Prescott V. Kelly is in charge of the new office.

Fairbanks, Morse & Co. has purchased the entire business of the Luster Machine Shop & Railway Equipment Co., 917 Arch street, Philadelphia, where a new branch will be opened under the management of Mr. D. W. Dunn. E. J. Luster, former president, will be manager of the machine tool division of the Fairbanks, Morse Philadelphia branch.

Inter-State Portland Cement Co., Des Moines, Ia., has been incorporated with a capital of $3,100,000. The officers are: President, Parley Sheldon, Ames, Ia.; vice-presidents, L. K. Nickols and W. B. Barney; secretary-treasurer, Paul W. Carroll; general counsel, George Cosson; chairman of the board, B. F. Carroll.

ATTRACTIVE PUBLICITY

So far as commercial publicity consists of a compelling and pleasing appeal to the eye, the Austin Machinery Corporation has achieved it in a series of art letter heads of artistic and typographical merit that are also so conspicuous that communications written below them will be very unlikely to go into the waste basket without more than the usual attention.

A set of eight artistic pictures are printed in colors across the full width of the top of the letter page, occupying from one-third to one-quarter of the total space. Each picture is an attractive landscape showing in the foreground a different important unit of Austin plant in operation and inscribed with a brief suggestive title. Pains have been taken to eliminate, as far as possible, the details, so that the type of machine and the character of its services are made prominent and an idea of efficiency is given without the study of perplexing minor features.

These pictures on letter sheets with tinted margins represent a considerable outlay which is justified by the effect of "class" that they convey.